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CLINIC OF DR EMMET RIXFORD

SAN FRANCISCO HOSPITAL STANFORD DIVISION

CARCINOMA AT THE ILEOCECAL VALVE CAPTURE OF A LOOP OF SMALL INTESTINE WITH OBSTRUCTION A PROBLEM OF INTESTINAL ANASTOMOSIS

A MAN aged thirty nine giving a history of having had increasing abdominal discomfort for a year or more which culminated four months ago in vomiting spells particularly vomiting in the morning of food taken the night before The vomiting attacks increased in frequency vomitus finally becoming fecaloid Spasmodic abdominal pain chiefly central sometimes felt radiating downward and to the left Loss of 40 pounds in weight in four months

Examination showed patient to be a middle aged man evidently underweight abdomen moderately distended exaggerated visible peristalsis in the small intestinal area Apparently the whole small intestine would undergo a simultaneous periodic forcible contraction forcing fluid and gas through the obstruction with a gurgling sound In the right abdomen at about the level of the navel a somewhat movable tumor of indefinite outline about 7 cm in diameter Occult blood in the stools Wassermann reaction negative

Provisional Diagnosis—Carcinoma of the cecum with obstruction of the small bowel

x Ray Examination—It is interesting to note that x ray examination with barium enema showed no abnormality in the outline of the colon or in its mobility Some of the barium

passed upward a short di tance into the ileum This finding was difficult to reconcile with carcinoma at the ileocecal valve causing obstruction of the ileum The normal radiographic outline of the cecum and the passage of barium apparently through the ileocecal valve was almost enough to suggest that the tumor originated in and obstructed the small intestine

Operation by median incision showed the tumor to be located at the ileocecal valve and to have captured a loop of the ileum several feet higher up causing obstruction of the proximal end of the captured loop A portion of intestine between this point and the ileocecal valve was empty and collapsed The explana tion of the x ray observation of the entrance into the small intestine of the barium was at once evident It simply entered either through the ileocecal valve or through the other end of the collapsed loop of the bowel probably the former

The loop of bowel between the ileocecal valve and the point of obstruction was not only collapsed but was hypertrophied This indicated that at least in the earlier stages of the tumor there had been for a considerable length of time increa ing ob truction at the ileocecal valve After the carcinoma had captured the loop above and obstructed it it had perforated at the point of obstruction permitting a certain amount of drainage of intestinal contents directly from the proximal end of the obstructed loop into the cecum and absolutely preventing any fecal matter from entering the loop below

The absence of contents aod therefore of demand for per istalsis and absence of irritation of the surface of the growth at the ileocecal valve permitted subsidence of whatever part of the obstructing mass was inflammatory and thereby opening up the ileocecal valve to a greater or le s extent as shown by the entrance of barium from the cecum

The ileum and jejunum from the upper point of obstruction were distended and hypertrophied so that the diameter of the lower loops was 6 or 7 cm Numerous glandular metastases were found in the mesentery near the tumor but the liver and other abdominal viscera were apparently free and therefore it seemed pos ible for surgery to give relief and possibly cure

trophied which could only mean that the ileocecal valve had been seriously obstructed The powerful muscle of loop 1 would cause dilatation of loop 2 to 3 with almost certain perforation at the point of anastomosis

III Double anastomosis of 1 and 2 and 3 and 4 would meet the objections of the first and second procedures but it would have objections of its own namely the anastomosis of 3 with 4 would probably seriously interfere with subsequent resection of the tumor Moreover both anastomoses would be contraperistaltic and in the subsequent operation loss of considerable amount of small intestine from each of the three loops 1 2 and 3 would be inevitable

IV Resection of the tumor and the lower loop of the ileum by cutting across 1 and 4 closing the ends and making an isoperistaltic lateral anastomosis of 1 and 4 This would seem to be preferable to either II or III notwithstanding the sacrifice of the entire loop 2 to 3

V Resection of the tumor preserving the lower ileal loop by cutting across 1 2 3 and 4 say at point 5 closing the ends of all four loops making an isoperistaltic lateral anastomosis of 1 and 2 and of 3 and 4

The choice of operations seemed to lie between I and V I would be merely a palliative emergency measure V an attempt at radical cure

The above de ok but a few minutes less than it takes to tell it The t stated the patient was in good con dition thus f o shock It therefore was determined o attempt procedure V Salt solution had been ven at th the operati The fo rapidly cut etween clamps the aw edg by linen reat difficulty was encount ig the mf ene glands without destrov tion to the This was accom plish except f us obstruction as sho rtrophied ming cyanotic It st when sca as felt that because the cir gu as much freer

than normally and would permit liberties to be taken not otherwise justifiable. It was simpler to remove the entire ascending colon instead of cutting it at 5 This further obviated the retention of a portion of colon above the anastomosis which would otherwise remain as a blind sac likely to retain its contents

A rapid lateral anastomosis was then made between 1 and 2 and 3 and 4 The patient manifested little evidence of shock until the work was being done on the mesentery as if the traction on the mesentery were responsible. He became quite weak, but after closure of the wound regained consciousness though did not recover from the shock He died six hours after leaving the operating room There was little loss of blood

In view of the outcome it is probable that the choice of procedure I would have been better under the circumstances notwithstanding its disadvantages and the necessity for a subsequent operation although so great a length of the small intestine would have been thrown out of function as to make it doubtful whether the man would improve much in nutrition

On histologic examination the tumor proved to be an adenocarcinoma and involved the ileocecal valve and the mesial wall of the cecum The mesenteric lymph glands contained numerous metastases

If a given surgical procedure succeeds in solving a problem and curing the patient it is taken for granted though it may not be true that that procedure is the best that could have been devised At least it is certain that it was adequate.

If on the other hand the procedure fails it presents an obligation on the part of the surgeon to review the evidence in the case minutely in order to discover the cause of the failure and formulate a better procedure We learn by our mistakes more than by our successes so that it is more logical to publish our failures than our triumphs to the end that others may profit by our mistakes rather than learn the same lesson by the sacrifices which are apt to be the result of their making the same mistakes

CLINIC OF DR FRANK W LYNCH

University of California Hospital

VAGINAL REPAIR UTERINE SUSPENSION APPENDECTOMY

Our case this morning presents a number of most interesting gynecologic conditions and brings up several basic points for our consideration

This patient is twenty seven years old and has had an uneventful medical history until her marriage five years ago The family history is negative and her menstrual history has been perfectly normal until most recently She has had 2 children the elder of which was born spontaneously four years ago after a normal pregnancy She wore no abdominal support during pregnancy She says that the physician took stitches ' immediately after the baby was born Three or four months after her labor the patient began to complain of backache and a sense of pressure in her pelvis She sought no medical advice however She states that her obstetric physician made no pelvic examination after her discharge from the hospital Three years later the woman again became pregnant and gave birth to a normal size baby after a labor of seven hours Her pregnancy again was uneventful and she did not wear abdominal supports The backache returned soon after delivery and with it came bearing-down sensations and presently leukorrhea She went to another physician who told her that she had ulcers of the womb and a displacement for which she took a long course of tampon treatment and local applications without noticeable relief She came under our charge two months ago We replaced the uterus and inserted a pessary Pessaries however have not held the uterus in position She now presents with

the above complaints and with the findings of a relaxed vaginal outlet a lacerated and hypertrophied cervix and an enlarged retroposed retroflexed uterus for which she has come to operation None of these findings can be cured without operation

This pelvic condition is a frequent sequelæ of child bearing The chief interest centers in the condition of the cervix and the retroposition The pathology in the cervix is self evident There is considerable discussion as to the significance of the retroflexion

There is a school of surgeons that operate without hesitation any posterior displacement of the uterus on the ground that it is abnormal and is giving symptoms which if not evident to the patient at the time are nevertheless present and are inducing reflex disorders This class of surgeons may do far more harm than good Fortunately they are no longer in the ascendency We have very good proof that the position of the uterus is not the paramount issue but that symptoms arise only from associated pathology which is not always present but which when present will cause recognizable alterations in the uterus itself

In another study we have shown that retropositions of the uterus corresponding to retroflexions or retroversions of the second and third degree were found in 41 1 per cent of 1230 of my obstetric cases at some time during the year after confinement and the etiology did not appear to be related to the number of children the woman had had forceps delivery or to relaxed vagina that all of the displacements did not occur shortly after labor but that they might come on as late as nine ten or even eleven months after labor In fact 24 per cent of the entire serie of 505 retrodisplacements developed the displacement after the fifth month postpartum Moreover only 32 per cent of the 505 cases of retrodisplacement developed symptoms which could be ascribed to the pelvis as did 10 per cent of the 775 cases which presented normal uterine positions

In another study we are attempting to ascertain the frequency of symptoms in women who have been known to have retroversions for several years and although the study is not complete it shows that women may have retroverted uteri for at least five

or six years without symptoms provided the ovaries and tubes are normal that there are no varices of the broad ligament and that there is little or no parametritis We have found moreover that cases presenting symptoms due to the displacement uniformly show enlarged boggy uteri as secondary manifestations of the associated pelvic pathology This woman had such a condition We believe therefore that her pelvis is causing symptoms for which operation is indicated

The outlet as you see is relaxed and there is a moderate cystocele and considerable rectocele One should estimate carefully both the amount of relaxation and the extent of necessary repair before this weighted posterior vaginal retractor further stretches the weakened perineum

Just a word as to the preliminary preparation The patient entered the hospital yesterday She has not been purged It is a barbarous practice to keep a patient awake the night before the operation with the cramps from an unnecessary purge Purging moreover is not essential The patient was shaved yesterday and the abdomen cleaned with water and soap and then with alcohol Last night she had some bromid She had a soapsuds enema at 6 o clock this morning A few moments ago the vagina was washed successively with soap and water ½ of 1 per cent lysol and with 70 per cent alcohol The bladder was then catheterized and 30 c c of 1 200 silver nitrate solution was instilled as a safeguard against cystitis The cleansing was done after the patient was asleep since otherwise she is aroused from the morphinization and takes the anesthetic less readily

We have seized the cervix with tenacula and pulled it down into direct view Without much traction it comes into the vulval cleft which shows that considerable descent has characterized the retroflexion We shall curet the uterus after dilatation with Hegar dilators for purposes of exploration We emphasize the importance of this measure It may avoid many heartaches in case the woman became pregnant immediately after her menstrual period seventeen days ago or in case she has an early cancer We therefore curet as a routine procedure even if we do not suspect either pregnancy or a cancerous growth The cavity

is 4 inches long This shows that the uterus is enlarged and that it is probably giving symptoms

It seems difficult to believe that this big hypertrophied cervix has arisen purely as a result of these cervical lacerations which we see here and which occurred in childbirth Yet such is the fact The process however is rather indirect Cervical lacerations heal rather slowly by granulation after labor When they are deep they retard the involution of the uterus and constitute a portal of entry for parametrial infection They split the cervix open and allow the lower part of the canal to become everted so that it presents as an erosion on the cervical lip The everted tissue is covered only by a single line of high columnar epithelium These cells are constantly bruised when the cervix is forced down on the posterior vaginal wall as the woman strains The rectum lies immediately behind the posterior vagina and nearly always contains fecal masses that are responsible for much injury of the everted mucosa

The cervical glands which open on the everted and neighboring surfaces become infected in turn Their bottle like necks become occluded and the whole gland becomes diseased The cervix hypertrophies in response and contains numerous areas of round cell infiltration A parametritis soon develops which is characterized at first chiefly by induration of the uterosacral ligaments The process soon extends to the base of the broad ligaments in severe cases Sudden traction on the cervix in a case like this always occasions pain The entire condition could have been avoided had the physician made a primary cervical repair at time of labor Yet he probably was taught not to do so and was told never to inspect the cervix or to sew it unless there was evidence that the cervical laceration was responsible for a considerable amount of hemorrhage Some day all physicians will know enough to inspect the cervix as a routine after labor and to sew all cervical lacerations before repairing the perineum If secondary cervical repairs were simple and satisfactory procedures there would be no need of urging primary cervical repairs at time of labor as a routine procedure But secondary repairs are neither satisfactory nor simple Resection is neces-

sary in all cases and there is some difference of opinion as to how valuable the resulting organ ultimately becomes The subject of cervical resections has sprung up again recently with the introduction of an operation proposed by Sturmdorff We have not become interested in it since we see it only as a non essential modification of a very old method

To effect cure it is necessary to remove this infected glandular tissue (Fig 263) This can be accomplished by a number of methods, all of which are identical in their fundamental procedures By the method of Martin we bisect the cervix in this

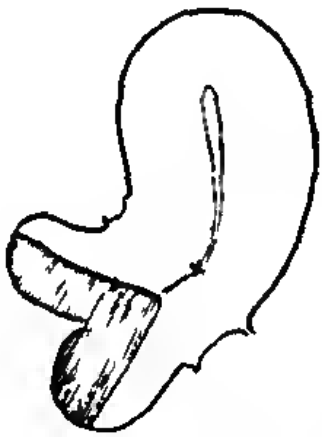


Fig 263 —Endocervical resection Shaded area outlines infected portion of hypertrophied cervix

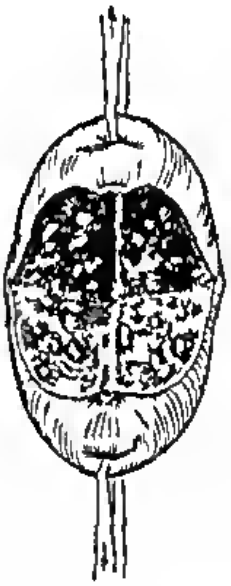


Fig 264 —Endocervical resection Cervix is bisected to expose upper limit of infected tissue

fashion (Fig 264) Traction of the tenacula opens up the cervical canal (Fig 265) so that we can inspect it carefully and remove all tissues which do not appear normal (Fig 266) See we may cut transversely as high as necessary and get the maximum exposure We can readily control the bleeding from the paravaginal vessels by transfixing sutures A wedge shaped piece is now taken from the anterior lip in this fashion (Figs 267 268) It removes all the diseased tissue in this area (Fig 269) The vaginal flap is now apposed to the margin of the cervical canal by No 2 chromic suture (Fig 270) The process is repeated on the posterior flap Closure is made as shown in Fig 271

As we have said there are other methods which accomplis the same thing Newman now of San Diego described som

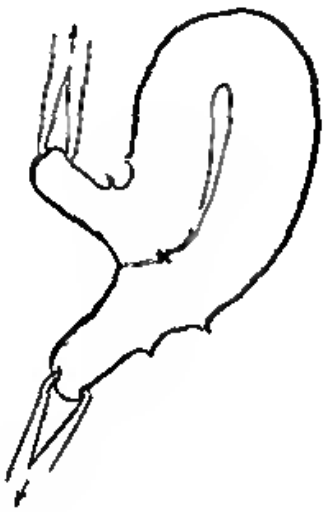


Fig 265 —Endocervical set Lateral view after cervix is bisected

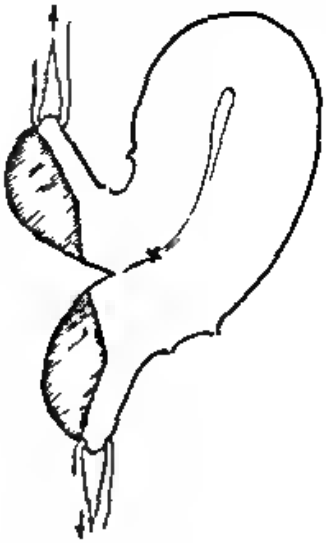


Fig 266 —Endocervical esec t Lateral view showing area to be removed

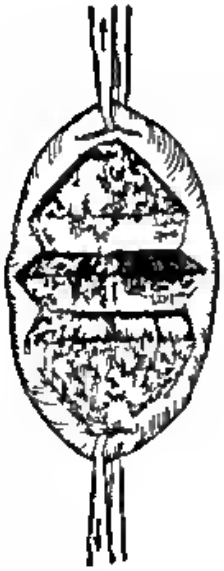


Fig 267 —End cervical se t Cervix after bisection and wedge shaped removal of infected areas.

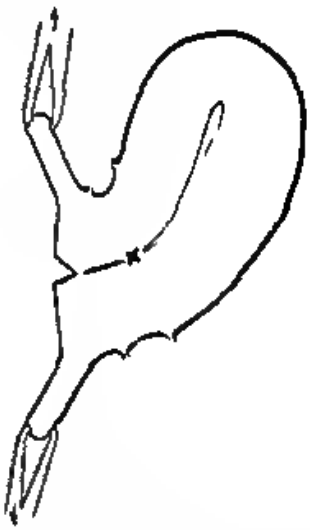


Fig 268 —Endocervical sec t Lateral view after section of infected cervical tissues

thirty years ago a method practically identical with that of Sturmdorff Newman pulled down the infected tissues by trans fixing the cervical canal with a tenaculum which he devised and

whose sharp points cross the midline like a diminutive letter T He then cut out the infected areas with a right angled knife devised for the purpose Sturmdorff s operation is similar save that a cone shaped wedge is removed about the cervix instead of the two wedge shaped sections of Martin s or Newman s method We call attention to these variations in technic to emphasize the

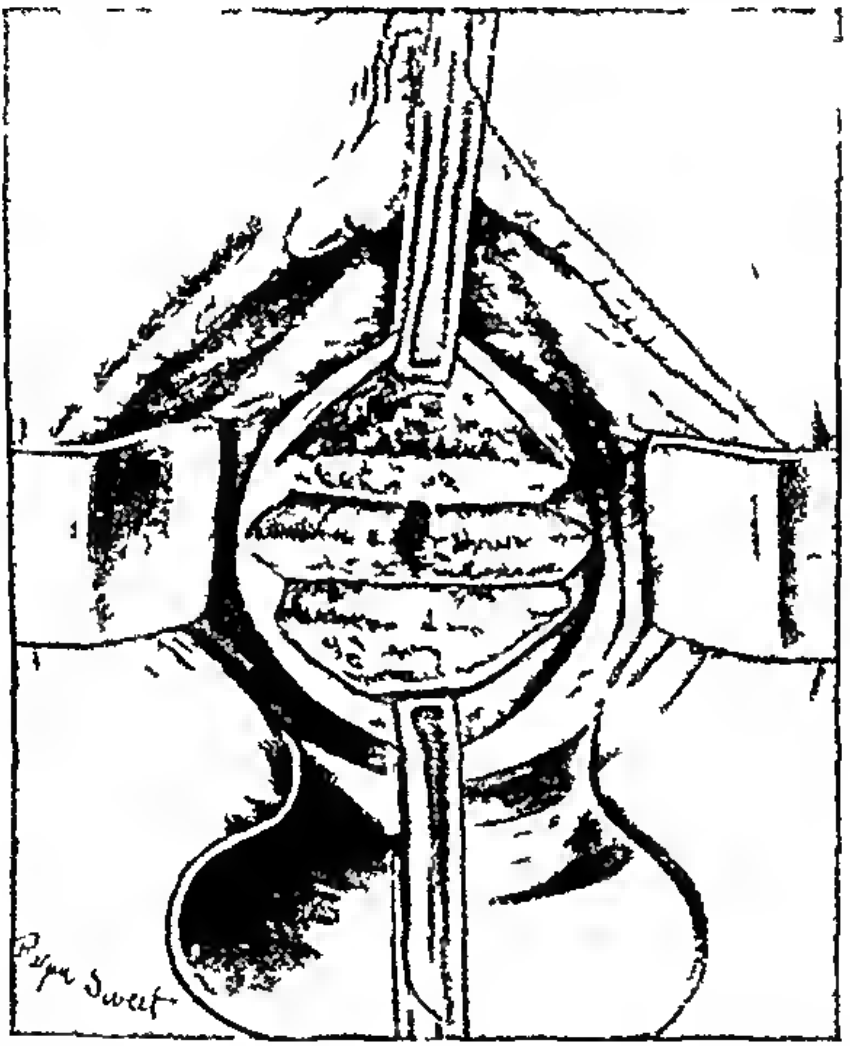


Fig 269 —Endocervical resect on Denuded areas to be approximated

fact that they all plan for the removal of the diseased glandular tissues of the cervix As you can see this operation of Martin permits absolute exposure of the cervical canal It does not prevent pregnancy or interfere with the course of labor

We shall not discuss the vaginal repair at length except to emphasize the importance of the fascial support Formerly men

were afraid of the results of cystocele operations and did not have a clear idea of the important steps of the operation which then consisted in a removal of vaginal mucosa rather than a resection of hypertrophied fascia The anatomy of this region was first ably described by the younger Martin son of the one whose

Fig 270—E d rv l esect Ch m N 2 sut app x mating ca al d t face of ec vical fl p

cervical operation we have just performed Yet Martin s description of the fascia has not been as much responsible for the cure of moderate sized cystoceles as the general adoption of the dissection scissors to open up lines of cleavage Any one using dissecting scissors for the denudation of the vaginal mucosa will

find that his plane of cleavage is *between* the bladder and the fascia so that (often unconsciously) by the use of dissecting scissors alone the surgeon has prepared suitable flaps for the cure of the deformity Personally we favor in addition to the fascial repair the cystopexy idea of George Gray Ward which in effect

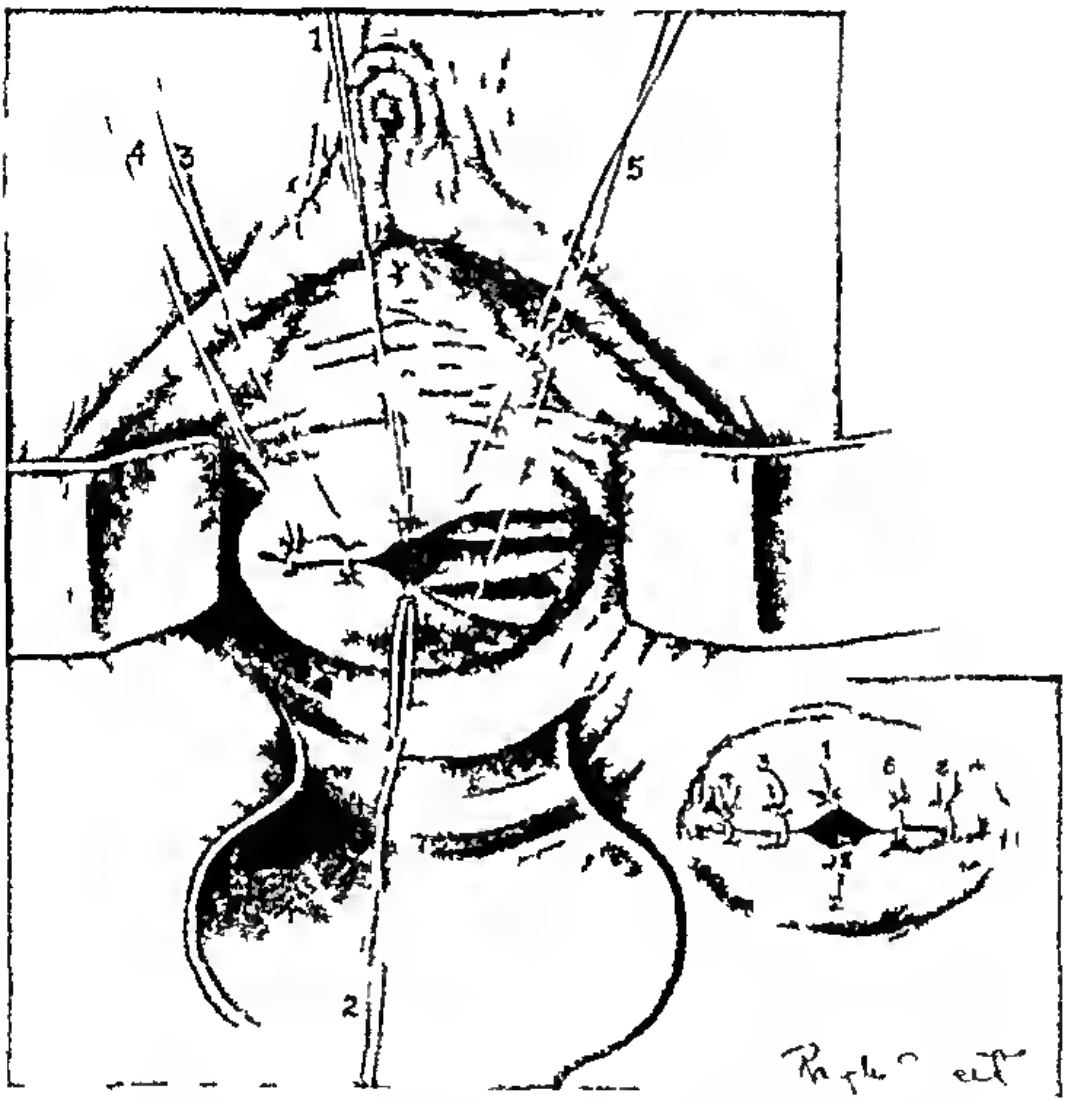


Fig 271 —Endocervical resectio Placing of sutures to complete a new cervix Appearance of cervical repair completed

makes a bladder elevation since it raises the bladder wall on to the anterior surface of the uterus and narrows the angle of the vesico uterine plica and thus diminishes the force of the downward intra abdominal thrust

The rectocele operation is identical in principle and aids to

shut off the hernia of the ampulla of the rectum through the weakened vaginal floor We carry our incision high up—even as far as the cervix—prepare our flaps and close with rectopexy sutures as described in our clinic on prolapse (Surgical Clinics of San Francisco April 1922)

The abdomen is opened by a midline incision reaching from the navel to the pubis There are several small vessels immediately under the skin which sometimes bleed slightly We will not ligate them since this very slight bleeding from the wound will cease as soon as the abdominal retractors are in place We now incise the fascia and expose the edges of the muscles so that in closure the cut edges of muscle and of fascia may be directly united This reduces the ever present chance of hernia in the wound The peritoneum now lies exposed We take a clean knife and forceps before incising it Be careful when you pick up the peritoneum with your forceps that a loop of bowel is not included in the bite Incise the peritoneum deliberately so as not to injure bowel Before packing back the intestines we shall explore the upper abdomen We record the exact findings in each case in our history of the operation The self retaining retractors are in place You see the uterus lying back in retroflexion The fundus is not in evidence since it lies far down in the pelvis The tubes and ovaries are likewise out of view

You note the round ligaments running from the sides of the false pelvis to the region of the upper uterine margin of the bladder In their outer third they lie embedded in the fascia and connective tissues from which they project as a rather thin band scarcely half again the size of an ordinary window curtain cord

It seems unfortunate that no better structure than a round ligament is available to check the backward movement of the fundus Experience has shown us however that if properly performed a round ligament operation will cure It is less complicated moreover than plications of the base of the broad ligament which do not always accomplish the purpose and carries less risk than the theoretically sound operation of uniting the uterine portion of the uterosacral ligaments to the sacral periosteum

Plication of the peritoneal aspect of the uterosacral ligaments does not cure

The middle third of the round ligament is thicker Here it lies in a distinct mesentery Experience has taught us that a round ligament of this appearance is not likely to be firmly implanted in the inguinal ring Even if we make a new fixation of the round ligament upon the uterus we know that the retroflexion will recur if the insertion of the round ligament in the groin is not firm This case will probably call for a new attachment of the round ligament into the abdominal wall or groin You see that the ligament is not firmly attached in the groin and pulls out to a considerable extent as we make traction upon it The basic operations which fix the abdominal or groin end of the ligament are the Alexander and the Olshausen We do not favor the former since it necessitates other incisions and more dissection The Gilliam operation and its modifications appear to us as variations of the Olshausen principle differing from it only in technic We shall fasten the round ligament in the groin by an Olshausen modification but before proceeding to the operation let us examine the uterine end of the round ligament

We have shown that in long standing retroversions the round ligament often pulls out from its normal high insertion in the fundus sliding down as it were to a point so low down on the uterus that forward traction on the ligament will not bring the fundus forward in anteflexion If such a condition prevails any new fixation of the ligament in the groin will not keep the uterus forward A new uterine insertion will also be necessary Let us ascertain the condition in this case We will seize the midportion of the round ligament with these clamps and make a forward pull upon them to see if the uterus will come up into a normal anteflexion position As we pull we see that the round ligament has a fan shaped attachment on the uterus and pulls chiefly from the lower hand which is inserted in the uterus just above the vesico-uterine margin (Fig 272) Even when we bring the clamps forward as far as the internal inguinal ring the uterus does not assume a forward flexion but lags behind because the main pull of the ligament is not upon the fundus This is rather a

common finding yet it has occasioned remarkably little comment in the literature The deformity has been found in at least 10 per cent of our cases We have shown that it accounts for most of the failures of men who do only one type of round ligament operation

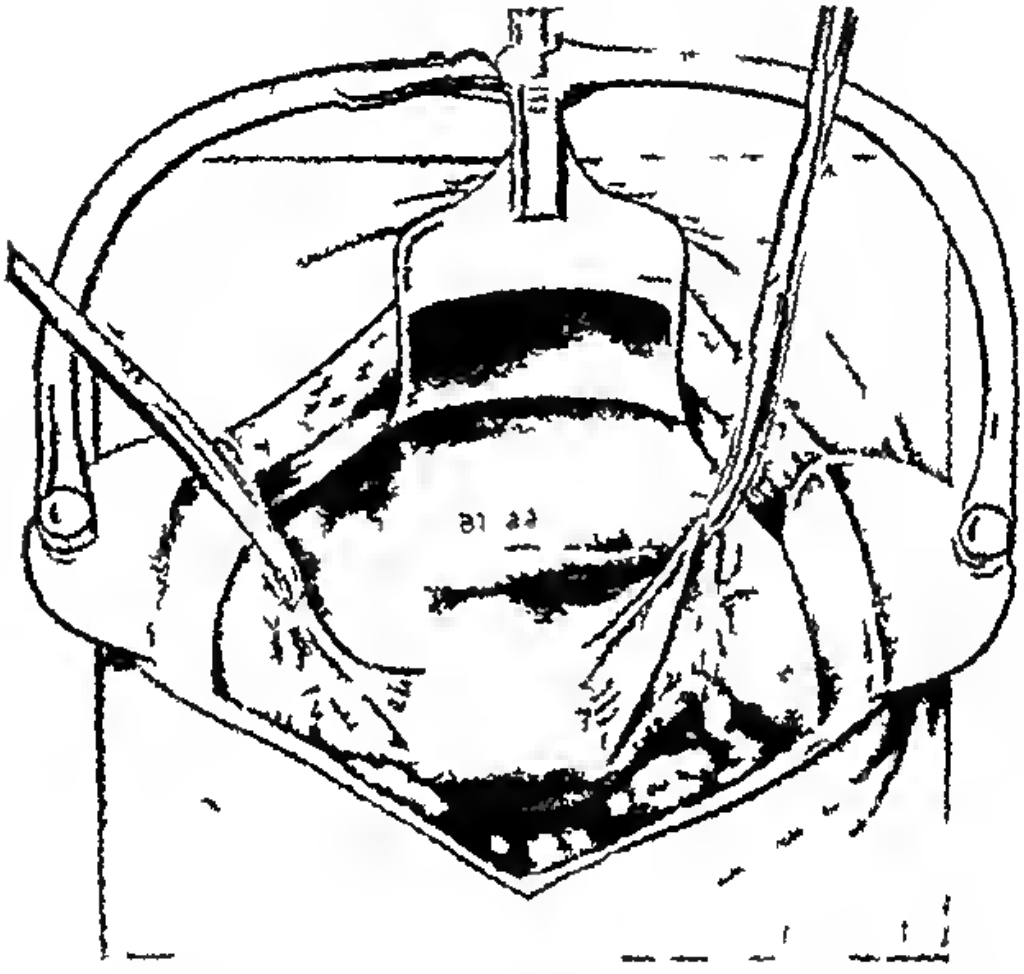


Fig 22—Atypical round ligament use to Forward pull on right round ligament with pinched attachment of the ligament the pull not directed toward fundus

This case therefore needs a new insertion of the round ligament both in the groin and uterine fundus It is just as necessary as are the two supports of a hammock The groin fixation is simple Two purse string Pagenstecher sutures will give a firm fixation The other part of the operation is not so simple

As we examine the appendages we see that the right ovary is prolapsed and that its ligament is twice its normal length and

that the veins in both broad ligaments are numerous and en gorged This suggests varicose veins of the broad ligament but the diagnosis cannot well be made while the pelvis is elevated It is best made before operation by examining the woman stand ing a thing we neglected to do Yet the case seems well suited for a Webster suspension because (1) the ovaries are fairly nor mal although they contain many tiny cysts a condition we shall disregard (2) the veins are dilated and (3) because a new uterine insertion of the ligament is needed

No operation elevates the uterus as well as the Webster or secures such a normal anteflexion features that are essential to the cure of the varicose veins of the broad ligament and prolapse of the ovary There are objections to the operation only when done in ill selected cases and with a poor technic It has not however come into wide usage because the proper technic is rarely described

Before starting this operation we shall sew the round ligament as it comes out of the groin to the abdominal wall with two purse string Pagenstecher sutures The first bite of the needle takes the fascia on the lower border of Poupart s or just below it and mesial to the internal ring The suture emerges just out side the bladder margin and picking up peritoneum transfixes the round ligament so that that structure will overlie the knot The second suture is placed in the same manner By so doing we avoid the larger vessels which lie external to the knots and the deep epigastric vessels which lie above it This method advances somewhat the round ligament so that its pull is more anteroposteriorly than before

The next step is the Webster suspension While we hold the uterus with one hand we thrust this long hemostat under the tube and ovary and close to the side of the uterus through the broad ligament to emerge on the anterior surface of that structure just above the round ligament Be careful not to carry a blood vessel on the end of the forcep or you may have trouble some bleeding We nick the anterior surface of the broad liga ment with a knife and let the forceps come through With the hemostat we catch the round ligament very close to the insertion

in the groin There should be no more than 1½ inches of free round ligament between this new fixation at the groin and the bite of the clamp This is most important for the success of the operation The forceps is now pulled back through the broad ligament carrying with it the doubled up round ligament The

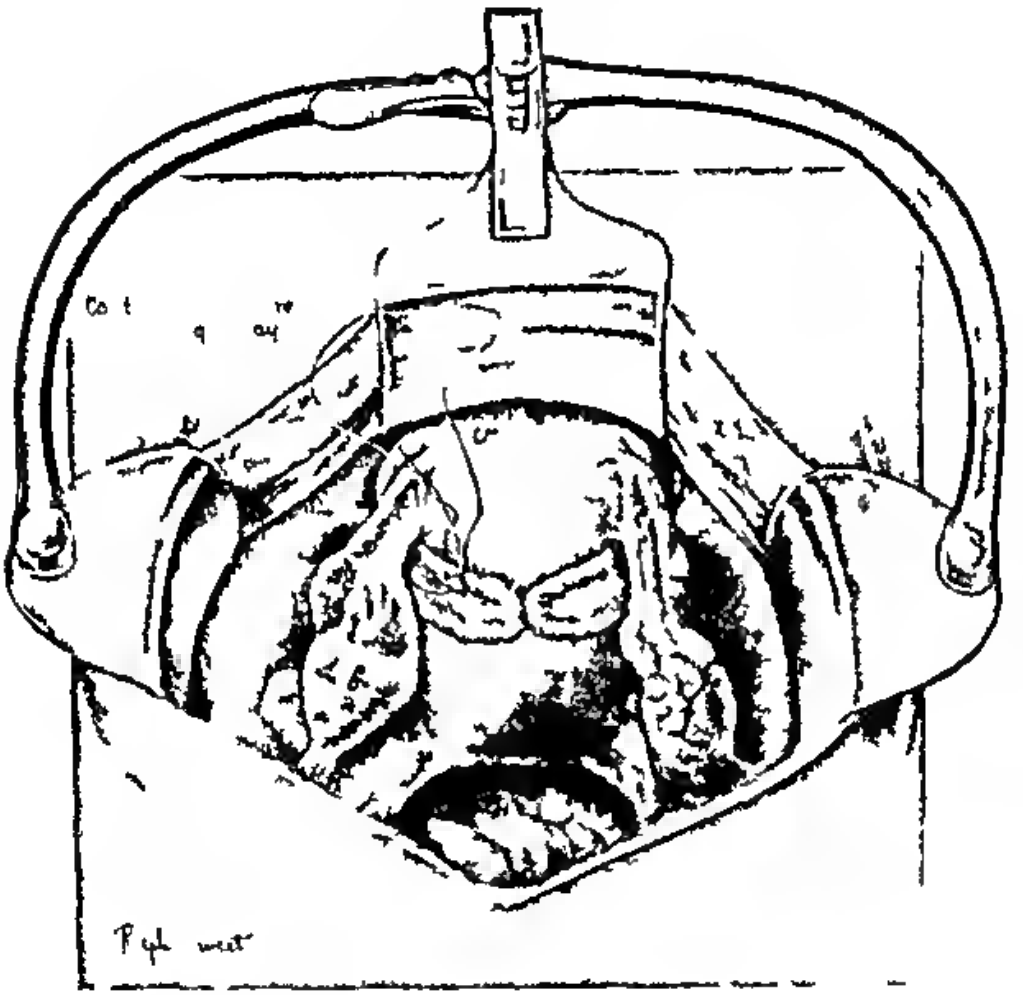


Fig 273 —W b t pe f th t N t t ght p ll f l g me t d t h rt f e port n Th ght t va ia l gam t lo gated Th t ru l ated nd r ymphys Int rrupt d ch g s t re f P ge t ch F gu how begi g of pe to zat

free part of the latter structure is pulled through and held with shorter clamps for purposes of identification We fix the round ligament on the posterior surface of the uterus just below the level of the utero-ovarian ligament so that the round ligament runs straight and is not curved in a manner to compress the

ovarian or tubal circulation The fixation sutures are Pagenstecher Three or four are necessary on each side (Fig 273) The first suture pierces the round ligament just where it was seized by the forceps that was thrust through the broad ligament Do not remove the clamps until the suture is safely tied The other fixation backs up the first one The perforation in the

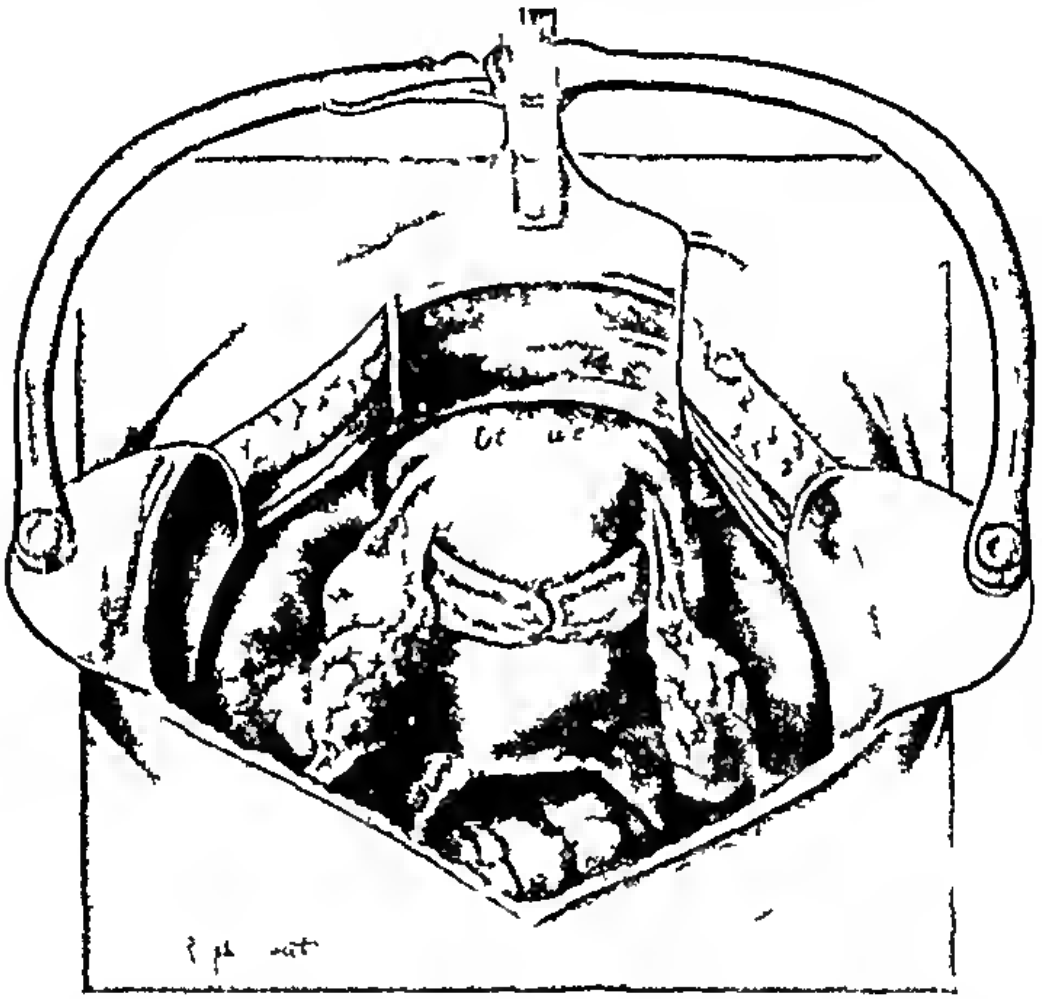


Fig 274 —Webster suspension completed Peritonization by non irritating suture has covered raw edges with mesentery of the folded round ligament

broad ligament is now closed with Pagenstecher the bite of the suture including the round ligament

Now follows a most important step of the operation which is to cover the Pagenstecher knots with a less irritating suture to reduce the chance of ovarian or intestinal adhesions To that end we make a cover of No 00 plain catgut, pulling up the

mesentery of the round ligament as a cover for all raw surfaces (Fig 274) The new insertion of the round ligament everywhere lies close to the uterus There are no holes in which a hernia may develop Occasionally we shorten the utero ovarian ligament

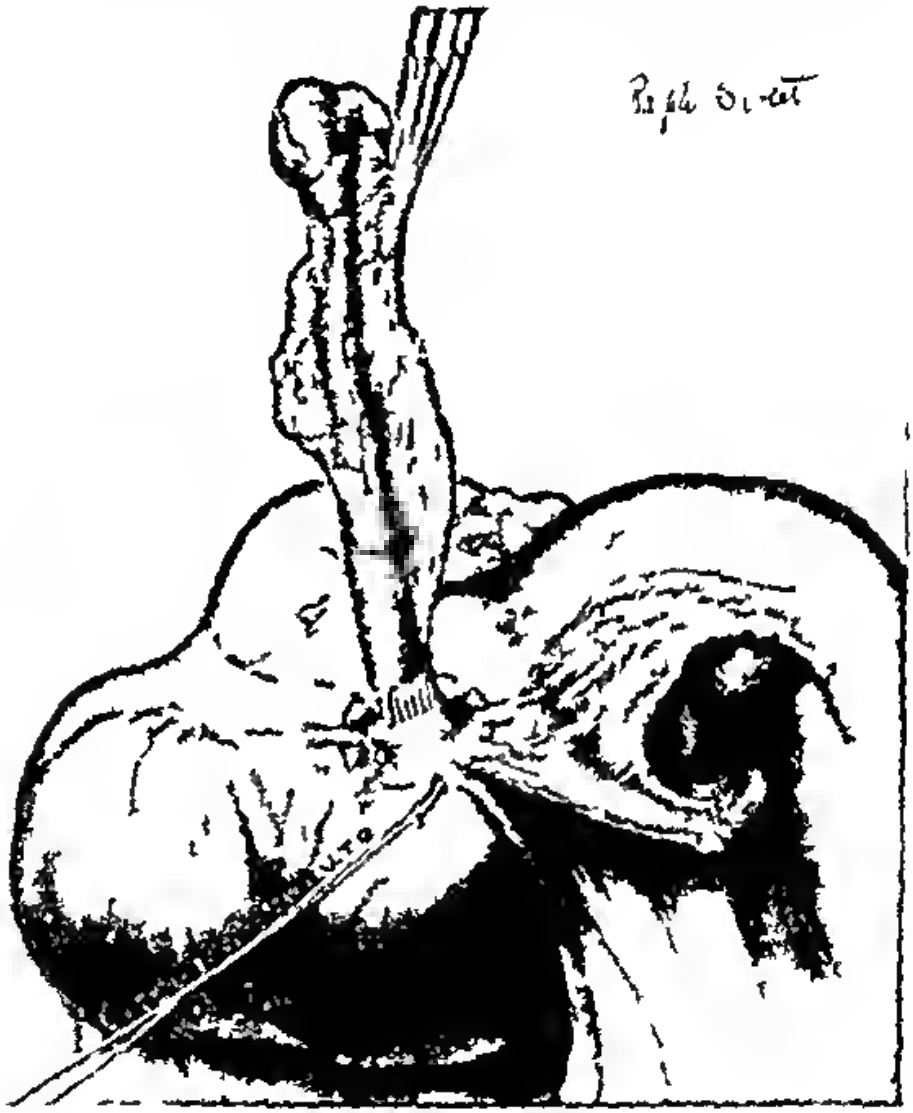


Fig 275—P t zat l ppe d w nd Th m o-append ha bee l gat d d nt Th base of th ppe d v l be c hed A p rse string s t e ha bee l d fo the l

by including part of its margin in the suture This aids in elevating the ovary Often it improves the peritonization on the back of the uterus

The uterus now rides well forward in anteflexion It is freely

movable but springs forward when we release backward pressure on the fundus There is only this inch or less of free round liga ment anterior to the broad ligament The ovaries hang sus pended over the new round ligament fixation The result is perfectly satisfactory There are no raw surfaces to invite adhesions The case can go through pregnancy The obstetri cian however should be urged to see that the uterus is kept forward postpartum

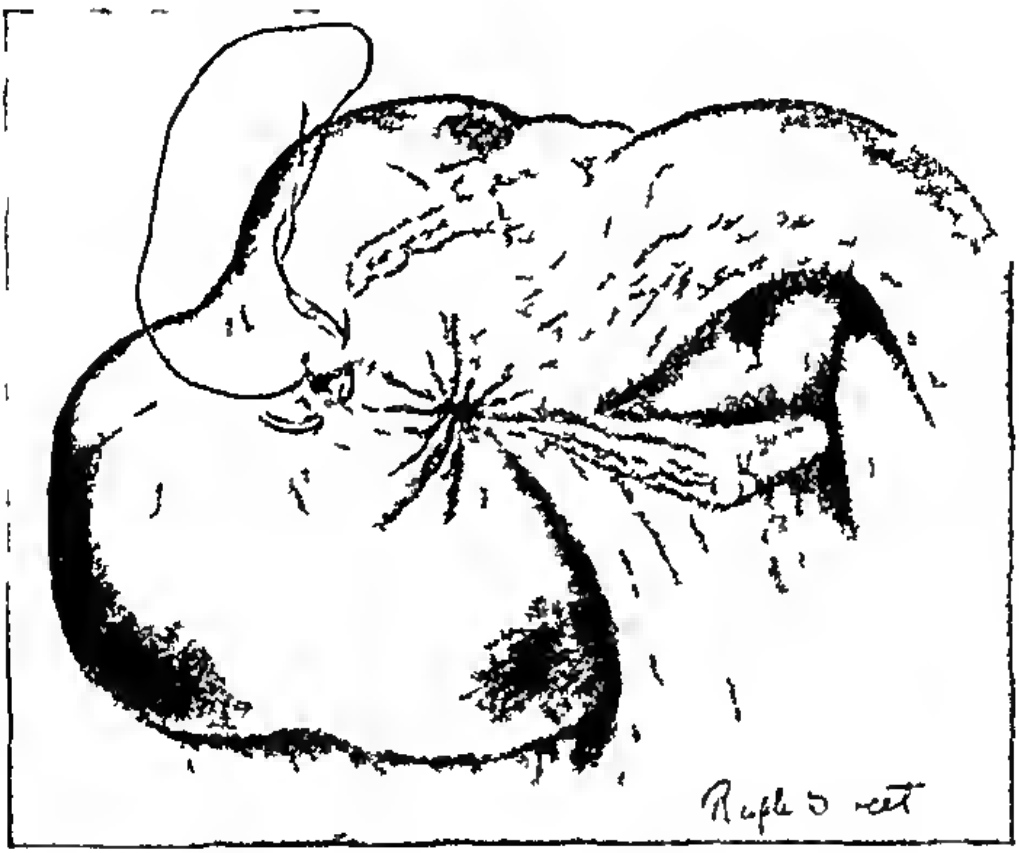
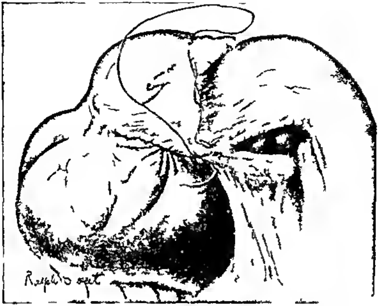


Fig 276 —Peritonization of appendix wound The continuous No 00 cat gut suture begins above the appendix wound

While we are in the abdomen we should remove the appendix even though it is normal Had the operation been extremely long or if the patient were in bad shape we should not do so There is only one point in the appendix technic to which I would call your attention It is the peritonization after the appendix has been removed and its stump has been inverted The usual technic pulls the ends of the cut mesentery up and ties them over



F g 277 —P rito izat f ppe d w d The co t n No 00 catgut t re ha v rt d the edge f th m bo t th appe d x w d

F g 278 —P t izat f ppe d wo d I rs o f the t dge of th ppe d mese t ry compl t th l

the appendix site with the second purse string suture We feel this method is not sound since we have seen many intestinal obstructions follow such procedure We make it a point to invert all our raw surfaces by a running No 00 catgut suture after the usual purse string of Pagenstecher has inverted the stump This is well shown by the drawings (Figs 275–278) The cut edges of the meso-appendix are inverted Take care in this closure not to shorten the ileocecal fold and constrict the terminal ileum

Preparation is now made to close the abdomen in layers after all sponges and instruments have been counted

to return home with instructions to report from time to time before advising any operative procedure

Fig 279 —Case I x Ray showing complete ulterior cervical lesion on the right side Slight symptoms

Case II —This case was brought before us through the kindness of Dr Alson R Kilgore Patient is a man of forty well developed and muscular of stocky frame Twenty years ago when he was actively engaged in athletics especially base ball and tennis he was suddenly seized with pain in the right shoulder and down the right arm He was supposed to suffer from a strained ligament and was compelled to give up all forms of exercise in which the right arm was used excessively The pain improved but for years on unusual exertion it would recur Six months ago on attempting again to play baseball he had a recurrence of all his early symptoms with severe pain in the shoulder and down the arm not extending however into the fingers He finds that certain movements will bring on the pain such as reaching forward with his arm On putting on his overcoat it is necessary to put it on the affected arm first He

cannot sleep on the affected side and finds that when in bed he must carefully place the right arm over the chest in order to be comfortable The pulses are equal no nerve changes to be found The pain comes and goes very quickly and therefore he has no permanent disability On the other hand his ability to carry on exercises is considerably curbed and in even the

Fig 280—Case II *x* Ray showing an lateral cervical rib complete

simpler things of life pain frequently is brought on We would consider this case a fit one for operative interference (The *x* ray picture Fig 280 shows a complete cervical rib on the affected side with an absence on the left side)

Case III (Fig 281)—Miss J M aged thirty nativity English waitress

Complaint —There is a feeling of heaviness in the entire right arm resembling a dead weight blueness of the finger tips swelling of forearm and hand with entire forearm and hand feeling numb and cold Power to use hand diminished and there is a dull constant pain from the shoulder to the elbow

Family History —Father died at fifty two years cause unknown Mother living and well sixty years of age Four

Fig 281—Case III X Ray light cervical both implant Symptoms three days (Operative case)

brothers and three sisters all in good health Family diseases There is no history of gout diabetes cancer or tuberculosis Father while living had frequent attacks of rheumatism No one in the family has had any complaint of a nature similar to that which the patient has at present

Past History —Of the infectious diseases of childhood pa

tient had mumps chickenpox and scarlet fever Patient enjoyed good health as a growing girl Gives no history of frequent colds or sore throats has never been confined to bed with any serious illness

Operations —None

Habits —Sleeps well and feels refreshed in the morning Appetite bas always been good Bowels regular Two cups of tea at each meal Alcohol none

V D —No history of G/C or lues

Marital History —Patient single

Catamenia —Menses started at sixteen years of age in type very irregular generally late at the present time is twenty eight day type and regular Flow always lasts from four to five days moderate in amount Pain severe in character during the first two days of menses which necessitates patient s going to bed at times

Present Illnesses —In September 1921 tbe patient was visiting at the Giant Forest where the weather was rather cold and at that time the finger tips of her thumb and first finger of the right hand became blue and gradually the other three fingers were included There were no otber symptoms at that time and when the patient returned to her home in Hanford where the weather is warmer the blueness of ber fingers disappeared With the onset again of cold weather the thumb and first finger of the right hand again became blue the other fingers being included in addition to which the hand felt numb cold and useless There was also a peculiar sensation in the right forearm The patient consulted Dr Lovas of Hanford who diagnosed cervical rib and verified the same by an *x* ray

Three weeks ago the finger tips of the thumb and first finger of the right hand again gradually became blue this blueness extended to the tips of the other fingers and the hand as a whole was cold and numb which feeling extended up the entire arm until patient s arm felt like a dead weight while there was cyanosis of the finger tips patient noticed there was pallor present over the rest of the extremity and the ability to use the hand has been markedly impaired In addition to the feeling of

coldness and numbness with blueness of the finger tips there is continual dull pain in the arm from the shoulder to the elbow which has only been present since the onset of the last attack Patient has noticed that the right hand and forearm is some what swollen

Examination —Patient is a young well developed and well nourished woman of athletic type Her nervous system seems most stable Pupil are equal and no hoarseness of the voice is noted The thyroid gland is large but symmetric No symp toms or signs of hyperthyroidism were elicited Both supra clavicular fossæ are well filled out and on palpation a bony tumor mass is felt on the right just external and above the sternoclavicular joint The subclavian artery is easily palpable and gives the impression of being higher in the neck than usual and more superficial A distinct hrunt and thrill are heard and felt Pressure over the hard tumor causes pain to extend down the arm comparable to that given as a symptom The course of the musculospiral nerve can he easily determined by the marked tenderness The forearm is a trifle swollen measuring 2 cm more in circumference than the left The hand is usually very pale but occasionally cyanotic The tip of the thumh fore and middle fingers are permanently and extremely cyanotic suggesting an impending gangrene The vasomotor reaction following pressure is extremely sluggish in the arm and hand and absent in the first two fingers and thumb Allowing the hand to remain dependent or cold causes acute pain over the radial supply of hand and arm overlapping to median distribu tion On palpation the hand feels cold and clammy The pulsa tion of the axillary artery can be felt high in the axilla but no pulsation is palpable below Blood pressure right 130/70 left 0/0 There is very marked paresis of the abductor muscles of the arm the extensor muscles of the forearm hand and fingers and of the supinator muscles of the hand A most marked hypesthesia of the radial distribution overlapping into the median distribution of hand and fingers is noted There were no symptoms on the other side

Dr Callander kindly consented to examine this patient with

a surface capillometer observing the flow of blood in the capillaries of the thumb It was noted that the blood corpuscles flowed very slowly, practically at stasis in marked contrast to the brisk flow noted in the left hand

The patient s general condition is negative There is no evidence of atavistic tendencies or congenital deformities Due to marked exacerbation of symptoms and of impending gangrene of the fingers since her stay in the hospital we feel that operation cannot longer be delayed for further study (The *x* ray plate of this patient (see Fig 281) shows a bilateral cervical rib but with symptoms present only on the right side)

Operation (Fig 283) —The incision which we choose to use in this particular case is of the so called ' hockey stick type the vertical limb being along the anterior border of the lower third of the cervical portion of the trapezius and the horizontal limb a little above the middle third of the clavicle and extending almost to the sternoclavicular joint This incision gives us plenty of room and allows us to work both on the anterior end of the rib where it is joined to the tubercle of the first rib and also on its cervical end where it is joined to the transverse process of the seventh cervical vertebra This latter may be reached best through the intermuscular space between the levator anguli scapulæ and the trapezius (Fig 284) This route gives better exposure to the cervical end of the rib than it is possible to obtain through the straight incision parallel to the clavicle We tie off the external jugular vein and find lying on the fascia the descending superficial cervical nerves Some of these are sacrificed if it is necessary to make room for the dissection Coming down now to the pad of fat at the base of the neck this is gently separated with forceps so that the transverse cervical artery and vein are easily seen crossing the field These are tied at either end The dissection is carried backward sufficiently far to expose the trapezius and the spinal accessory nerve which is seen coursing diagonally across the field (see Fig 284) The dissection is carried forward to expose the posterior border of the sternocleidomastoid which is retracted mesially so that the anterior scalene muscle comes into the field with the phrenic

nerve coursing over it (see Fig 283) The omohyoid muscle is now freed from the cervical fascia so that it can be retracted either upward or downward The brachial plexus can now be seen coming out of the scalenus medius and crossing the operative field In this particular case there seems to be an anomaly of the plexus in that the anterior and posterior cords are widely separated and the pressure of the rib seems to come upon the posterior cord thus producing the radial distribution of pain rather than the usual ulnar distribution The subclavian artery is developed just above the clavicle and with the omohyoid is retracted downward In this case the rib is felt just between the anterior and posterior roots of the cord and it is easy to retract the anterior roots upward and work between them as seen in Fig 283 The attachment of the scalenus medius to the first rib is severed completely With the retraction of the upper end there is left as you see a large cavity behind the plexus in the bottom of which the rib is felt Part of the attachment of the scalenus anticus is also severed from the tubercle in order to expose the articulation of the rib at this point This exposure gives us as you see an extremely good working space The fibrous tissue and muscles corresponding to the intercostals attached to the first rib are now carefully separated from the cervical rib on all sides being careful not to enter the pleural cavity The periosteum is left on the rib Following the rib backward through this approach it is easy with rongeurs to cut it off from the transverse process of the seventh cervical and we do not find it necessary to make any other approach posteriorly in order to reach this end of the rib Tracing the rib downward we find a synostosis between the seventh cervical and the first rib which it is necessary to sever with a chisel Just forward of this point and lifted upon it is one of the cords of the brachial plexus and the subclavian artery under tension Although on examination it appeared possible that an aneurysm had formed on the subclavian on account of the expansile pulsation that was felt we find no dilatation present The partial separation of the scalenus anticus to the tubercle makes it easy to disarticulate the rib at the forward attachment where the

joint had been formed and the rib is now easily slipped out from under the plexus The nerves and arteries drop into the large cavity left through cutting the scalenus medius The cutting of this muscle is therefore advantageous and will not be reunited Very little bleeding occurs throughout this operation as you note and we are able to close without drainage

Note—This patient left the hospital on December 7 1923 fourteen days after operation Her improvement has not been spectacular but has been steady up to the present time The arm was supported in an abduction splint for four weeks Ex

Fig 287—Same as Fig 281 *x* Ray after operation

amination of the capillary flow in the vessels showed marked acceleration of the corpuscles following operation The cyanosis gradually disappeared as did most of her symptoms especially the pain in the arm In a note from her on March 8 1923 she states that she is back at work as a waitress in a lumber camp that her hand is still sensitive to hot or cold water and perspires freely that the middle finger is still quite numb that the nails are hard and brittle but that she has no pain of any kind and is able to do her work Although the strength of this arm is somewhat less than the other she states it is improving all the time

As previously stated this case is interesting and instructive chiefly because of the marked vascular symptoms and the involvement of the posterior cord of the brachial plexus A large majority of the reported cases had symptoms referable to pressure on the medial cord Many text books emphasize the ulnar sensory and motor disturbances as a characteristic feature of the cervical rib syndrome Both the clinical picture and operative findings in this case demonstrate that the posterior cord was the one principally involved and the medial cord little if any affected

Discussion —The literature pertaining to cervical rib dates back two hundred years or more Much has been written about the subject and for those who are interested Streissler s Die *Halsrippen is most complete and gives an excellent bibliography*

Cervical ribs are present in at least 1 to 7 per cent of all subjects as evidenced by careful autopsy examination These vary in type and size and the great majority cause no symptoms 80 per cent or more are bilateral but strange to say 95 per cent give unilateral symptoms only

Many theories are advanced regarding the presence of cervical ribs The most plausible and commonly accepted one is that cervical ribs are an evidence of atavistic or reversion tendency Tredgold points out that the chimpanzee has twelve to thirteen ribs and the lemur thirteen to sixteen poorly developed ribs Capitan emphasizes that ostriches dolphins and porpoises have cervical ribs In the human embryo twenty nine pairs of rudimentary ribs are present seventeen pairs disappearing before birth All the cervical vertebræ have rudimentary ribs those of the seventh cervical being the last to disappear Supernumerary ribs have been described as arising from lumbar vertebræ Inasmuch as these seldom cause symptoms little attention has been paid to them

The transverse processes of the cervical vertebræ differ from the others as they have foramina for the passage of the vertebral vessels Unlike the thoracic vertebræ the lower cervical vertebræ have two centers of ossification called anterior and pos

tenor that form the transverse process Overgrowth of the anterior or so called costal process results in a cervical rib

For the purpose of description cervical ribs have been classified and Gruber's classification is the one usually accepted Class 1 Cervical ribs consisting of a node that does not extend beyond the transverse process Class 2 A blunt projection of bone 4 to 5 cm long Class 3 Ribs long enough to articulate with the first rib or attached to the sternum with a ligament Class 4 Complete rib with vertebral origin and costosternal cartilage

Cervical ribs are much more common in females the literature giving 70 per cent as the figure of incidence Oftentimes other congenital deformities are present Streissler states the occasional association of the cervical rib with spina bifida hare lip cryptorchidism dislocated lenses club foot, and congenital lipoma Oppenheim includes cervical rib in the list of so called stigmata of degeneration and indicates that they may be a feature of an underlying neuropathic diathesis Peter Bassoe reports 3 cases of syringomyelia in patients with cervical ribs He urges that a careful scrutiny be made for evidence of hypochondriasis psychoneurosis multiple sclerosis and unstable nervous system before operation is attempted In 3 of his cases the operation was a surgical success but all 3 patients were decidedly worse due to increase of their mental symptoms This point is certainly well worth remembering

The symptoms and signs of cervical rib are best classified under four heads—local vascular neurologic and remote All may be present but usually only a few are outstanding It has been stated that if the vascular symptoms are prominent the neurologic are often absent and vice versa Our experience has been that nearly all cases present neurologic symptoms and the more severe ones have vascular symptoms as well

The rib and its attachments usually produce a perceptible fulness in the supraclavicular region On palpation a bony tumor can be felt which is fixed and hard Pressure may cause pain simulating that given as a symptom This no doubt is due to pressure on the brachial cord already under increased tension

If the subclavian artery is involved a thrill may be felt and a bruit heard The artery usually is felt well above the clavicle and feels more superficial than normal

The neurologic symptoms depend on the parts of the brachial plexus pressed upon The cords are the structures usually involved and at a point between or below the scaleni muscles the medial cord bearing the brunt of the trauma Occasionally as in the case reported in this paper the posterior and upper cord are mainly involved Careful consideration of the sensory and motor symptoms will place the pathology in the brachial cord as contrasted with symptoms referable to peripheral nerves or brachial roots The patient may complain of neuralgic pains numbness tingling formication ataxia of arm and weakness Examination may reveal various degrees of hypesthesia more rarely hyperesthesia or analgesia The nerves and muscles supplied may be painful to pressure Individual muscles or muscle groups may be extremely weak and muscle reflexes diminished Atrophy of skin and muscles and change in tone and elasticity are often outstanding features

The vascular symptoms if present often are the dominating feature Whether they are due to direct pressure on the subclavian artery by rib or muscle or to vasomotor disturbance by pressure on brachial cords is a debatable question Telford reports 2 cases in support of Todd's theory Both of these cases showed marked vascular symptoms with signs of impending gangrene Ample exposure at operation revealed no pressure on the subclavian artery The removal of ribs and the relaxation of brachial cords effected marked improvement and eventual recovery Many writers have reported cases where the pressure on the subclavian had almost obliterated the lumen and in some cases a dilatation was produced distal to the point of pressure Halsted reports experiments on animals reproducing similar conditions

The patient may complain of slight coldness in the affected part Cold weather often excites an exacerbation of symptoms The fingers and hand may exhibit a definite pallor and return of color after pressure may be extremely tardy Often ery

thematous patches persist to be followed by a dry gangrene of the finger tips The pulse may be obliterated as high as the subclavian artery, and the blood pressure diminished markedly Signs of pressure on the subclavian vein are very rare but marked edema and cyanosis have been noted

Under the title of "remote symptoms we include those due to pressure on the sympathetic system such as unequal pupils endophthalmos signs of hyperthyroidism Pressure of the recurrent laryngeal nerve may produce hoarseness and spasm of the diaphragm has been reported as due to pressure on the phrenic nerve by a cervical rib

Cervical ribs have been reported as the predisposing cause of several cases of apical tuberculosis On the other hand apical tuberculosis with retraction of the dome of the pleural cavity have been mentioned as the exciting cause of cervical rib symptoms Cervical scoliosis is a condition frequently associated with cervical ribs

The diagnosis of cervical ribs is usually not difficult if the condition is borne in mind Trostler a roentgenologist reports a series of 65 cases in which the clinical diagnosis was correct in but 26 per cent Brachial neuritis and progressive muscular atrophy head the list of mistaken diagnoses With the aid of *x* ray the proper diagnosis is made much more simple One must remember however that frequently cases with short bony projections have cartilaginous or tendinous prolongations that provoke symptoms but do not appear on the *x* ray plate Law emphasizes this point and reports 4 cases where the *x* ray plates showed no cervical rib in patients with marked cervical rib symptoms Operation revealed ligaments extending from the transverse process of the seventh cervical vertebra to be inserted at the scalene tubercle costoclavicular ligament sternoclavicular and interclavicular ligament The brachial cords and arteries were stretched over these ligaments and under marked tension If the symptoms strongly suggest the cervical rib syndrome and all other conditions are ruled out operation is permissible and advisable in spite of a negative *x* ray picture

Sir Harold Stiles has pointed out that pressure of the normal

first rib may also be a predisposing factor in the etiology of brachial neuritis and has described an operation for the partial removal of this rib citing a case where relief has been obtained The pressure of this rib may therefore be the cause of recurrent symptoms in cases that have not been cured

In addition to conditions mentioned above the diagnosis of cervical rib has been confused with malformation of the first thoracic rib osteomas and exostoses tubercular lymphoma aneurysm of subclavian Raynaud's disease poliomyelitis and arthritis Brewer reports a case where an operation and extensive resection of the clavicle was far advanced believing the case to be one of osteosarcoma before the true diagnosis of cervical rib was made It is interesting to note that in 1893 Lewis Jones reported several cases of atrophy and sensory disturbances in the hands of young people that he ascribed to a neuritis *In 1905 Thorburn reported 4 similar cases due to cervical ribs* Following Thorburn's publication Jones re examined 14 of the cases previously reported as due to neuritis and found 10 to be cases of cervical ribs

Two interesting points regarding cervical ribs are the questions why they occur so much more frequently in women and why symptom usually do not appear until young adult life or middle age The first may be considered inexplicable Several suggestions are offered regarding the second Many patients date the onset of symptoms to the time of some accident or trauma to the neck and shoulders Wearing a heavy neck yoke the repeated trauma of carrying and firing a gun have been given as etiologic factors A plausible explanation is that when the structures of the body begin to lose their elasticity increased pressure is excited with a decreased amount of resiliency thus producing symptoms

Treatment is largely surgical but in those cases so mild or in cases complicated in such a manner as to preclude operation medical procedures may be tried Frequently the patient is made more comfortable by wearing any one of the variety of abduction shoulder splints In a few cases abduction increases the symptoms It is not uncommon to find that the patients

themselves have found the position of comfort especially when they are lying in bed as noted in Case II In mild cases the patient will usually appreciate a frank statement regarding his malady and will co operate with the surgeon If the condition grows steadily worse and medical treatment proves unsatisfactory he readily accepts operation

Three methods of approach are described The posterior route as described by Streissler has only been tried by himself on a few cases The approach is difficult and need not be described except to say that with the patient in a sitting position an incision is made about 2 cm parallel to the spine opposite the vertebral prominence extending a handbreadth up and down The usual methods of approach are anterior the one parallel to the clavicle and about a fingerbreadth above it the other a vertical incision along the trapezius muscle or a combination of the two When the rib is short it is unnecessary to make an incision parallel to the clavicle The vertical incision along the trapezius gives an easier route to the vertebra and the brachial plexus is practically undisturbed (Fig 284 shows this incision) The brachial plexus is well in front the line of approach passes through the intermuscular septum between the levator anguli scapulæ and the scalenus posticus directly backward to the transverse process of the seventh cervical To reach this point from in front requires retraction of the plexus and possible injury by pressure When the rib is complete however and articulates in front with the sternum or the scalene tubercle this incision is not sufficient and a combination of this with the longitudinal incision is advisable This is the so called hockey stick incision In our particular case it was not necessary to use the posterior end of this incision as it was easy to reach the cervical attachment of the rib through the anterior part This may not always be so easy and a portion of the rib may be left which continues to cause pressure (Fig 283 shows the exposure with the 'hockey stick incision) In neither case is the scar disfiguring No important anatomic structures need be sacrificed Careful dissection is necessary to avoid injury to subclavian vessels dome of the pleura brachial cords phrenic and spinal

accessory nerves Traction on the brachial cords must be very gentle as any undue roughness will cause a tremendous amount of postoperative pain and a great increase of nerve symptoms Passing a broad piece of tape about the plexus or individual

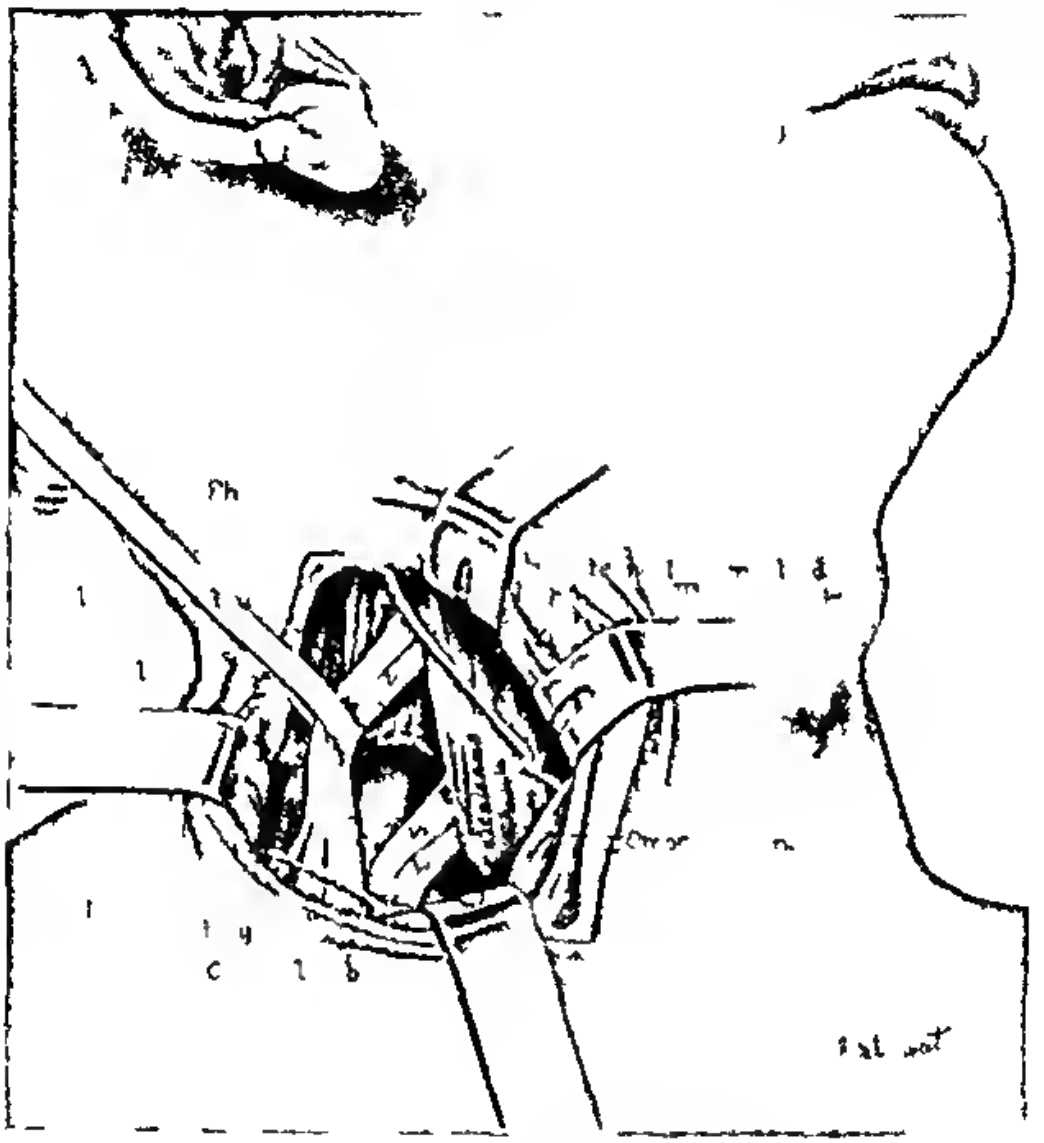


Fig 283 — Hockey stick incision for approach to the cervical rib

cords and using that for traction purposes is a useful safeguard In some cases the rib is reached most easily by retracting the plexus downward and mesially in which case the suprascapular nerve may be injured In other cases it may be retracted upward or again the operation must be carried on by separating the

two cords and working between them as was accomplished in the case presented to you

*Most authorities insist on taking the rib out with the peri*osteum intact to prevent a recurrence If this is possible without

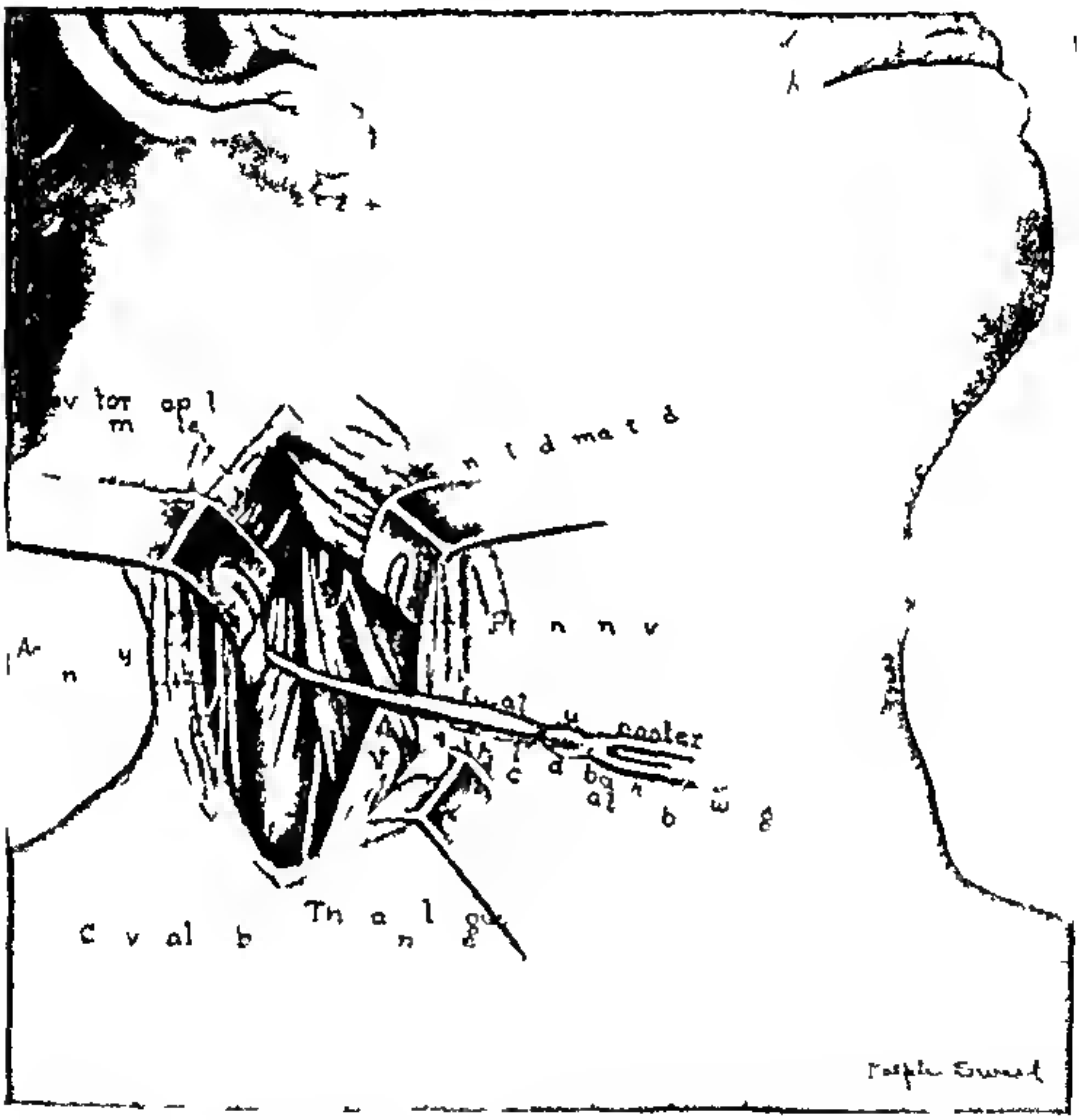


Fig 284 —Perpendicular incision along the trapezius between the levator anguli scapulæ and the scalenus posticus

danger of opening the pleura it is an added precaution The pleura has been opened during this operation several times without serious results but it is to be avoided To remove the rib subperiosteally is much more simple and has given excellent results in a great many cases The rib should be cut off as far

posterior as possible and the stump carefully rounded off The anterior attachment if any usually offers little difficulty

As a rule the patient does not obtain the maximum relief for ten to twenty months In vascular cases thrombosis of vessels has often resulted and compensatory circulation must be established Extreme care and gentle handling of the nervous tissues is repaid by a shorter period of convalescence A few cases are not benefited by surgical measures The reason may be mistaken diagnosis undue trauma to tissues incomplete operation or unusual scar formation However the great majority of cases do well and are greatly improved and the surgical removal of cervical rib must be classed as one of the satisfactory surgical procedures

CLINIC OF DR JOHN F COWAN

STANFORD UNIVERSITY HOSPITAL

EXCISION OF THE KNEE JOINT

EXCISION of the knee joint for active disease tuberculous or non tuberculous for arthrodesis or for the correction of a deformity the legacy of an ancient pathologic process results in the majority of cases in firm union between femur and tibia

In cases where no special attempt at arthroplasty is made osseous union is the condition sought That osseous union occurs in the majority of these excisions is easily demonstrated by stereoscopic roentgenograms in which bone trabeculæ may be traced from femur to tibia

There are however certain cases in which while union is firm stereoscopic roentgengrams show no trabeculæ continuous from one bone to the other but instead an irregular zone of lessened density between the bones This is interpreted as a firm fibrous union

Lastly a still smaller number of excisions result in varying degrees of motion between the bones and in these definite clefts or spaces are seen in the stereoscopic plates These are cases of loose fibrous union with cavities between the bones the formation of a nearthrosis

That the difference in end results is not due to infection is shown by the following facts (1) that all cases have healed *per primam* (2) that any one of these results may occur where excision has been performed for the correction of a deformity resulting from an old traumatic or infective arthritis many years previously or after attempts at arthrodesis for flail joint following poliomyelitis and (3) that union frequently becomes osseous in cases of excision of the knee for tuberculous or chronic pyogenic arthritis altough one feels that at the time of operation all infective material has not been removed

On the assumption that the excision of the normal knee joints of healthy dogs would result in bony union between femur and tibia a series of experiments was undertaken in collaboration with Dr L W Ely with the idea of studying the histologic changes in the bone and marrow leading to such union

In this series of 19 excisions we obtained bony union in only 2 cases and in these the union was between a small extent only of the sawn surfaces

In 3 specimens there was firm fibrous or fibrocartilaginous union in 8 a loose fibrous union and in 6 a definite new joint with cartilage and synovial membrane

As we had to deal here with normal tissues as all operations were done under strict aseptic conditions and as all wounds healed *per primam* with a minimal amount of inflammatory reaction it was apparent that the variation in end results was not to be attributed to infection

A second series of excisions of the knee joints of dogs was therefore undertaken to determine if possible the causes of these variations and as bony union was the end result sought we endeavored to determine the factors essential to bony union and the best methods of securing them

It is to be noted in the first place that the end results obtained in the first series namely (1) bony union (2) firm fibrous or fibrocartilaginous union (3) loose fibrous union with or without clefts lined by a tissue resembling synovial membrane and (4) a definite new joint are the possible end results following fractures of the long bones and it is quite apparent that the many etiologic factors given for the above conditions including a great variety of systemic diseases as well as local infective and non infective inflammatory conditions do not obtain in cases of excision of the knee joint in dogs

It is to be noted also that such local conditions as interposition of the soft parts disturbance of the blood supply of one or both bones or we may even assume disturbance in calcium or phosphorus metabolism general or local did not account for the large percentage of failures in bony union in the first series for in each of the six excisions of the second series bony union

was readily obtained between the entire or greater part of the sawn surfaces

Failure in bony union therefore must be due to local factors which are easily controlled

Our problem in these excisions is the securing of bony union between femur and tibia As most of the operations in the human are performed for tuberculous arthritis arthroplasty is contraindicated Even in cases in which the indications for arthroplasty appear clear the reports of end results generally have not been encouraging or at least have not given us a clear idea of the final results which can only be judged after a lapse of years

Arthroplasty requires a wide experience in the selection of cases a mastery of surgical technic and a thorough knowledge of physiotherapeutic methods which but few surgeons possess

The end results must not be judged alone by the amount of motion obtained for in the knee joint to a greater degree than in other joints good stability a fair resistance to hard work and painlessness are factors quite as important as motion

Recent reports notably by V Putti of Bologna show the possibility of creating new knee joints which possess excellent functional qualities and are painless and which even after many years do not lose their power but a bony ankylosis in good position is always preferable to a painful slightly movable and an unsteady pseudarthrosis

Before considering the process of healing by osseous union and the causes of failure of such union which result in the several types of fibrous union we shall describe briefly specimens illustrating these different types

In Dog 8 Series 1 (Fig 285) Removal of 9 5 mm of bone and cartilage from the tibia and 16 5 mm from the femur

Extremity immobilized by plaster of Paris spica for fifty four days After four hundred and thirty two days microscopic examination of specimens shows the bones united by bone, but across only about the central third The anterior and posterior thirds are united by fibrous tissue and fibrocartilage

The fibrocartilage is next the trabeculæ connecting the two

bones while the fibrous tissue greater in amount occupies the periphery and its bundles of dense avascular collagen fibres are directed parallel to the sawn surfaces of the bones and are continuous with the fibers of the fibrous layer of the periosteum

This tissue appears to have arisen by an ingrowth from the periosteum As a definite bone buttress has developed separating the marrow spaces from the fibrous tissue and as the marrow is fatty it would seem that the healing process is at an end

Fig 285—*A* Bone tissue becoming laid down *B* fibrous callus *C* fibrous tissue growth from periosteum Note bone buttress separating marrow spaces from fibrous tissue of bone

Dog 4 Series 1 (Fig 286) Removal of small portion of each bone Immobilization sixty nine days After one hundred and twenty two days microscopic examination of specimens shows end of femur irregularly convex while that of the tibia is concave The bone ends are covered with hyaline and fibrocartilage and between them there is a layer of dense avascular fibrous tissue the collagen bundles of which lie for the most part parallel to the bone ends and are continuous with the periosteum

Irregular clefts are seen between cartilage and fibrous tissue

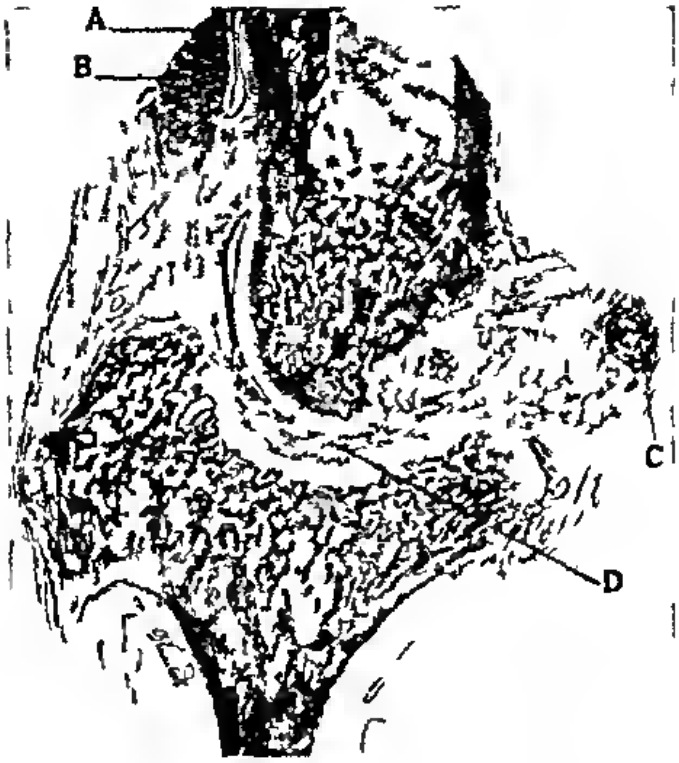


Fig 286.—*B* Patella *C* sesamoid bone *D* fibrous tissue ingrowth with cartilage above and below

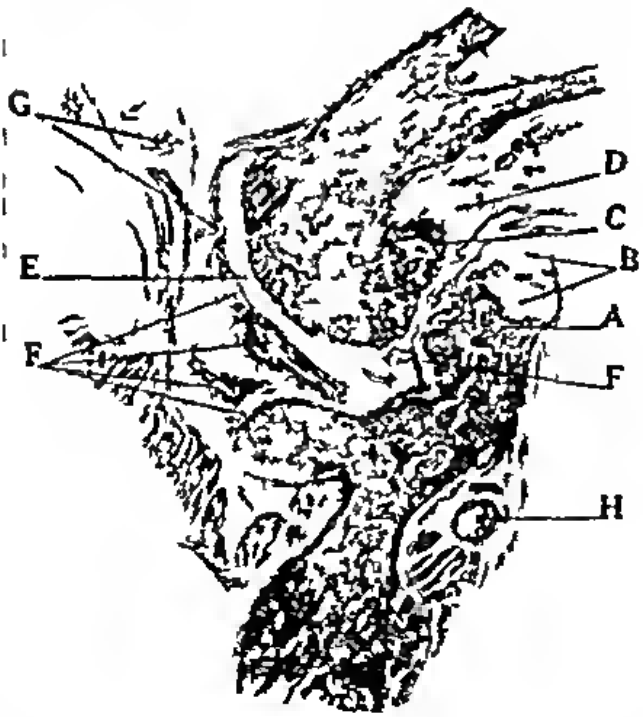


Fig 287.—*A* Spur on tibia *B* cartilage capping the spur *C* new bone in femur *D* cartilage capping the bone *E* new articular cartilage *F* slits or clefts in fibrous tissue (bursal cavities) *G* synovial cavities

which appear to be an early stage in the formation of a joint cavity

Dog 17 Series 1 (Fig 287) Removal of 22 mm from the femur (a large amount for a dog of this size almost reaching the medullary canal) and 7 mm from the tibia

Immobilization for about twelve days After three hundred and forty even days microscopic examination of specimens shows the convex end of the femur is received into a concavity

Fig 288.—*A* Dense fibrous tissue extending from femur *B* area of fibrocartilage *C* bone *D* cartilage

of the tibia The concavity is formed by growth of bone anteriorly and posteriorly there being more bone developed here than is required to bridge the gap between femur and tibia

The trabeculæ of the bone ends are considerably thickened a bone buttress has formed and the apposing surfaces are covered with new articular cartilage At the periphery the bones are united by fibrous tissue and large clefts lined by villous and irregular cartilage are seen In this specimen a new

joint has been formed with new cartilage and synovial membrane

Dog 16, Series 1 (Fig 288) Removal of 20 mm from femur and 17 mm from the tibia Immobilization fifty six days After ninety seven days microscopic examination of specimens shows the bones bound tightly together by dense fibrous tissue containing a few scattered cartilage cells There is no suggestion of a joint cavity

Anteriorly and posteriorly there are islands of fibrocartilage which are undergoing ossification at their union with the bones Anteriorly a long spur has developed from the tibia which extends upward in front of the femur

This irregularity of the bone surfaces together with the dense fibrous tissue binding the bones together makes the union quite firm Microscopic examination of the fibrous tissue shows it to be dense and avascular and that its bundles of collagen fibers extend for the most part from femur to tibia and are firmly united to the bones—anteriorly and posteriorly some of the fibers run for a short distance parallel to the sawn surfaces

The bone trabeculæ at the ends of each bone are quite abundant and a bone buttress has formed over the larger extent of the surfaces closing off the marrow spaces

In small areas the marrow spaces are still open The marrow in the immediate vicinity of the sawn surfaces is fibrous and edematous elsewhere it is lymphoid While the reparative process in this specimen has probably not ended judging from the fibrous marrow and open marrow spaces it seems likely from the character of the uniting fibrous tissue and the extent of the new bone buttress that bony union will not be the final result

Dog 20 Series 1 (Fig 289) Removal of 5 mm from the femur and 4 mm from the tibia Immobilization not stated but as plaster of Paris spicas were applied in all cases immobilization was at least attempted

After three bundred and four days microscopic examination shows bones bound together by fibrous tissue the central fibers of which run largely in a direction parallel to the bones An

teriorly some of the fibers are directed at right angles to the latter Clefts appear in the fibrous tissue the walls of which are quite irregular and the tissue lining them stains poorly A bone buttress has formed eparating the marrow spaces from a layer of cartilage capping the bone ends

In this series all excisions were done by the plane mode varying amounts of bone were removed and immobilization carried out for varying periods

No special attempt was made to bring the sawn surfaces of the bones into close apposition therefore all specimens showed varying degrees of separation of the bone ends

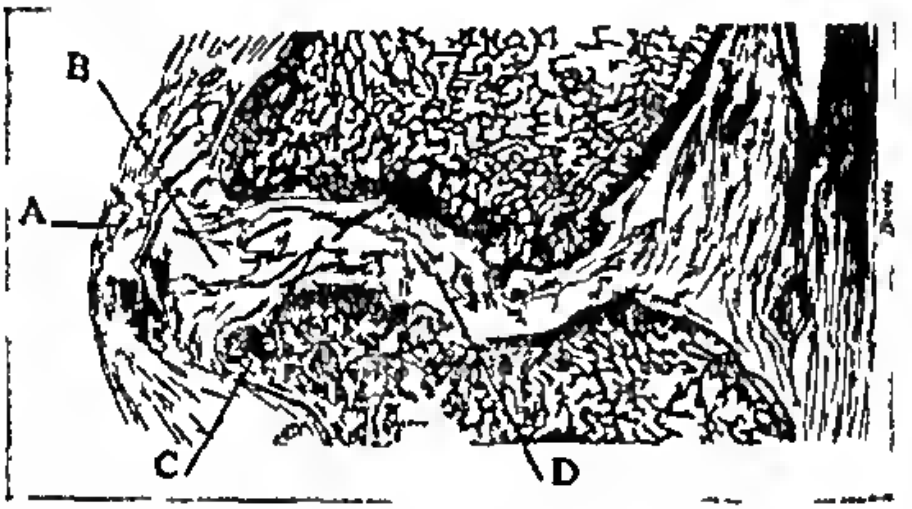


Fig 289—*A* P r t m nt u f m fem r t t bia *B* fib t growth *C* ca ty w th g l wall f t fib o t e *D* u t g fib o s t s th b dl f wh h pa ll l t lo g axi f bo e

In all specimens except two union is fibrous and in these two it is fibrous for at least two thirds the extent of the sawn surfaces (See Fig 285 Dog 8)

Separation of bone ends and fibrous union must be intimately related

In the second series therefore we fixed the sawn surfaces together in the following ways

In 2 cases we excised the joint by the concavoconvex method With the leg in acute flexion the posterior ligament and capsule were shortened by mattress sutures the leg was now extended

and capsule and fascial structures sutured clear around thus bringing the sawn surfaces in close apposition

The patellar tendon was overlapped and sutured In 2 cases the joint was excised by the plane mode and the bones brought together in the same manner In one the bones were

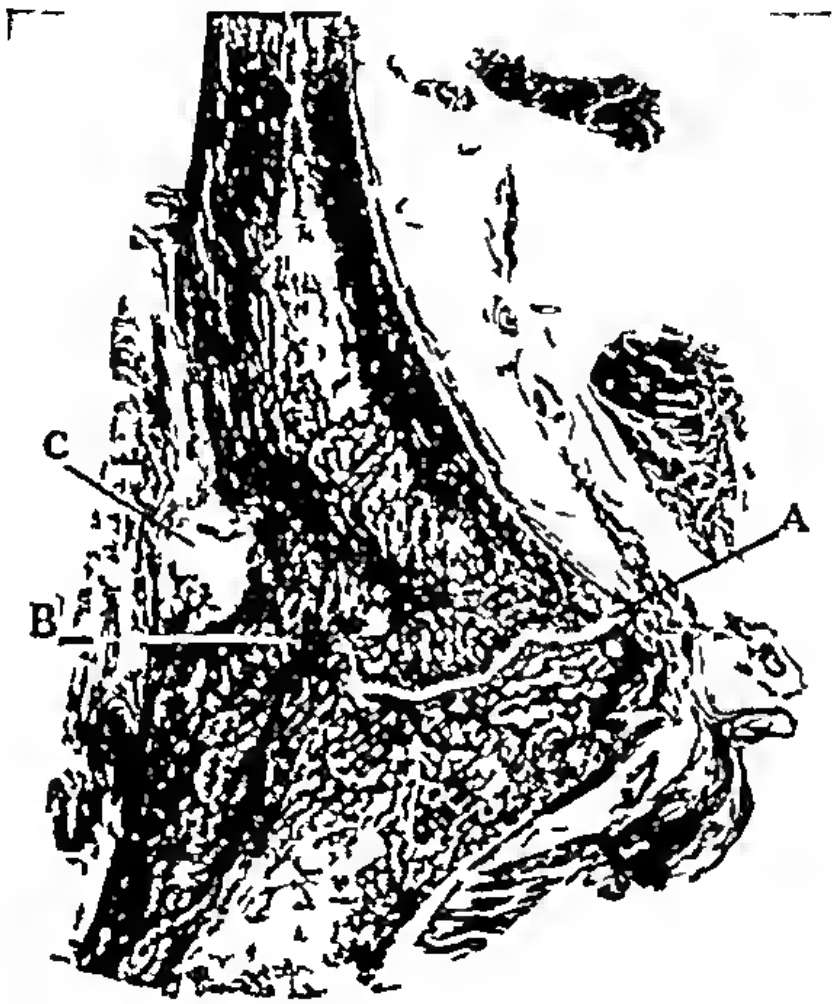


Fig 290—*A* Epiphyseal line *B* bone trabeculæ *C* small area of cartilage undergoing ossification Healing by osseous union except in small area *C* note periosteum continuous over line of union

held together firmly by silver wire placed through epiphyses ¾ inch from the sawn surfaces and fixed tightly In one fixation was made in like manner using a strong silk suture

In all 6 excisions bony union occurred between the entire extent of the sawn surfaces

Dog 1 Series 2 (Fig 290) Excision of joint by concavo-

convex method removing cartilage and underlying bone buttress Bones placed in apposition and held by silver wire Immobilization twenty four days After sixty seven days bones are firmly united by bony union over practically the entire extent of the sawn surfaces Anteriorly and posteriorly the periosteum is continuous from femur to tibia

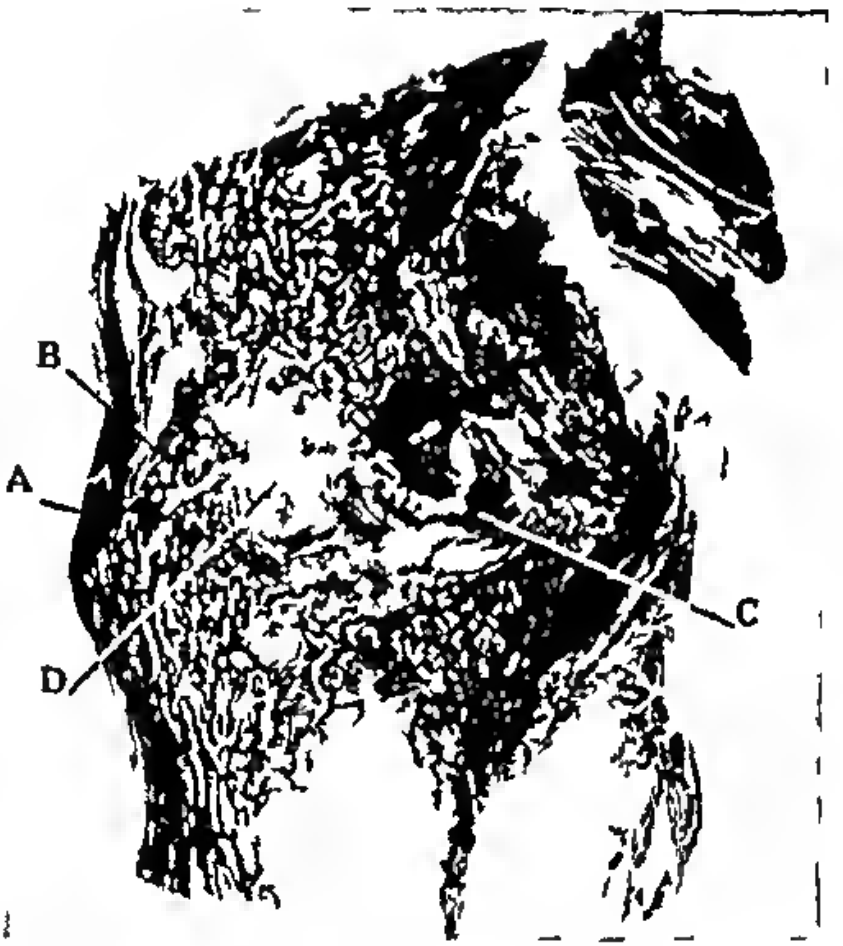


Fig 291—*A* Pe t m nt f m f m to t b *B* bo t a beculæ u t g bo *C* cartilag u d rg g fi at o *D* sam t le tage

Anteriorly beneath the periosteum at the level of the union of the bones there is a small area of cartilage undergoing ossification Elsewhere bone trabeculæ of the femur and tibia are continuous A portion of the epiphyseal cartilage of the femur remains The marrow is lymphoid Nowhere do we find any interposed fibrous tissue

Dog 3, Series 2 (Fig 291) Concavoconvex excision Bones united by silk sutures inserted in similar manner to Dog 1 After sixty days bones were firmly united Anteriorly and posteriorly the periosteum is continuous from femur to tibia Beneath the periosteum the bone trabeculæ are continuous from femur to tibia elsewhere the bones are united by fibrocartilage which is being invaded by blood vessels from the bones Numer ous osteoblasts are present about the blood vessels and osteoid material is being deposited The marrow is fibrous After sixty days we find no dense fibrous tissue between the bones

Fig 292 —Showing complete bony union between femur and tibia Note periosteum cortical and medulla portions of bones continuous

Dog 32 Ely (Fig 292) illustrates the end result in cases in which close apposition is secured by suture of the capsule There is complete osseous union of the entire apposing surfaces and a medullary canal bas been established througb the line of union

From the study of these specimens the reparative process following excision of the knee joint may be summarized as follows Hemorrhage from the vessels of the marrow spaces The blood fills the space between the bones and extravasates for varying distances into the marrow of each bone

The blood coagulates and fibrin is deposited on the sawn surfaces this seals the marrow spaces and the vessels of the

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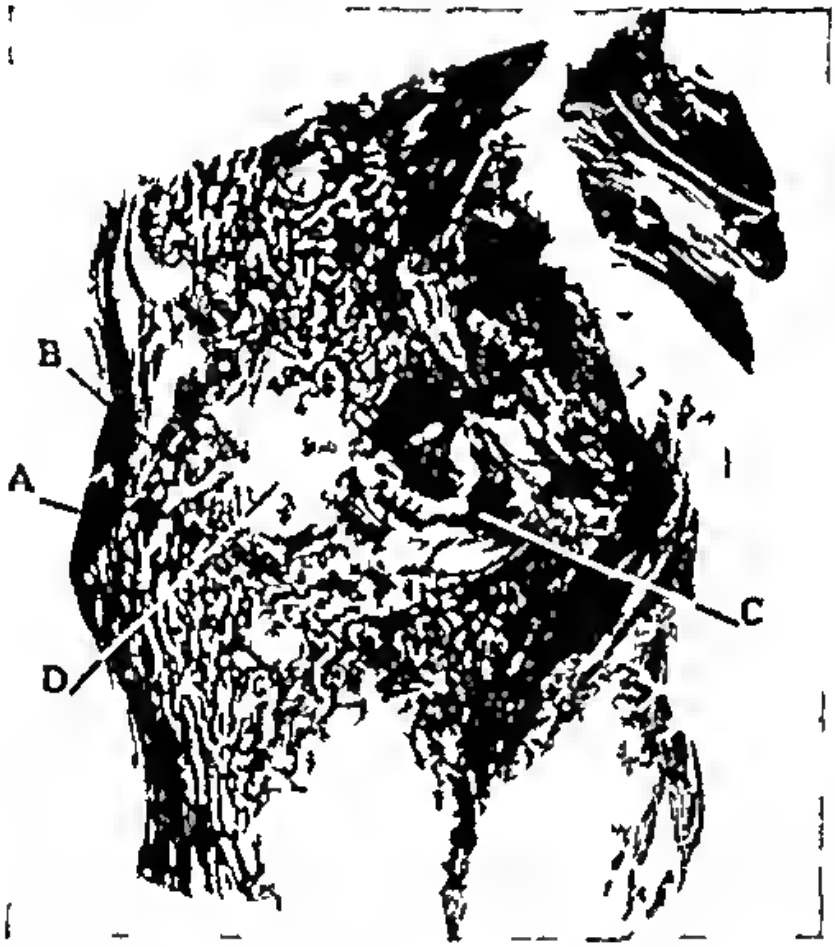

Fig 291—*A* Posterior aspect of sawn femur and tibia *B* bone extending beyond lateral border of tibia *C* cartilage undergoing ossification *D* sawn cartilage stage

Anteriorly beneath the periosteum at the level of the union of the bones there is a small area of cartilage undergoing ossification Elsewhere bone trabeculæ of the femur and tibia are continuous A portion of the epiphyseal cartilage of the femur remains The marrow is lymphoid Nowhere do we find any interposed fibrous tissue

to the same thing the more accurate the apposition the more infinitesimal the clot the more certain is the healing by osseous union

In all cases where special means were employed to keep the bones in close apposition bony union occurred rapidly and the extent of this union was in direct proportion to the extent of contact of the sawn surfaces

It is to be noted that in cases of joint excision there is nothing comparable to the periosteal bridge uniting fragments of a fracture

Leaving out of consideration the osteogenetic power of the periosteum this tissue serves two very important functions in the healing of fractures (1) the periosteal bridge prevents wide separation of fragments and (2) it serves to confine the blood from the lacerated vessels extending from periosteum to the haversian canals of the cortical bone which coagulates and is organized by granulations developing from the vessels of the haversian canals and marrow spaces

Subperiosteal callus is an important one in the healing of fractures and frequently exceeds in rapidity of development and in amount that formed from the marrow

Repair after knee joint excision is therefore dependent upon the medullary callus and this is as a rule rather slow in its development

If the bones are not maintained in close apposition but are separated by gravity as in cases of our first series the clot between the bones is greater in amount and there is an additional factor in the reparative process tending to delay or even completely stop osseous healing This is the ingrowth of granulation tissue from the periosteum This hardier connective tissue reacts to injury by proliferation invades and organizes the clot between the bones with greater rapidity than the more tardy granulations developing from the vessels of the marrow spaces It forms a limiting membrane which prevents the fusion of the vessels of the medullary calluses

The two types of granulations are easily distinguishable microscopically That springing from the marrow spaces is

delicate highly vascular and edematous with few collagen fibril while that growing in from the periosteum is dense less vascular and shows bundles of collagen fibrils directed for the most part parallel to the sawn surfaces

At times the rate of the growth of these two granulation masses appears to be about equal so that a combination or intertwining of the two can be made out In these cases the central fibers run for the most part parallel to the bones while those at the periphery are directed at right angles to the latter

The final result of the reparative process will depend upon which of these two masses of granulation gets the upper hand As has been said osteal fibroblasts proliferate along the capillaries of the granulations The tissue formed by proliferation of the dense fibrous tissue of the periosteum is similar in all respects to the tissue from which it springs It is dense and relatively avascular and seems to choke the more delicate and vascular granulations from the marrow spaces and prevent their fusion in a manner analogous to that which occurs in a so-called amputation neuroma in which we see the axis cylinders of the proximal segment of the injured nerve twisted and compressed in every direction There appears to be sufficient growth of axons in the neuroma to bridge the defect but they cannot get across

Likewise there seems to be no failure in osteogenesis in most of the specimens which have failed to unite by bony union for long spurs of bone more than sufficient to bridge the space are often seen extending from one or both bones

The ingrowth of dense fibrous tissue from the periosteum has acted as a limiting membrane to prevent fusion of medullary granulations It serves its purpose as efficiently as an interposed fat fascial flap and ultimately has the same fate

With the mobilization of the limb (removal of the spica) and its restoration to function particularly weight bearing the uniting fibrous tissue is compressed In addition to compression there are sliding movements between the bones especially in the anteroposterior direction These movements produce separation of the collagen bundles fibers are ground and torn and

irregular slits or clefts with ragged walls appear Continued compression with motion causes necrosis of these fibers as is shown by their structureless appearance and staining reaction and they are gradually absorbed or remain in the clefts as debris

Coincidentally with the disappearance of the dense fibrous tissue the medullary calluses of femur and tibia are undergoing changes

Where these are subjected to pressure and motion they are transformed into cartilage, where irregularities in the apposing surfaces are present so that depressions occur in which the tissue is not subjected to pressure we often find a tissue resembling synovial membrane This is seen also in other portions of the new joint where motion has existed without pressure

There is still another way in which function seems to play an important part in the variation in end result of the reparative process and this occurs in the cases of firm fibrous union

In these the fibers uniting the bones run for the most part parallel to the bones A bone buttress separates the marrow spaces from the fibrous tissue the bone ends are more or less serrated and the uniting dense avascular fibrous tissue bundles merge into these teeth of bone There is no cartilage formation over the bone ends save in small areas where the healing process is still incomplete and here the cartilage is being replaced by bone

We assume that in these cases the granulations from the marrow and periosteum have fused that with the mobilization of the limb weight bearing has not been resumed (the animal favors the limb because of tenderness or instability)

The weight of the leg produces tension on these granulations and the fibroblasts respond to this by the development of an abundance of collagen fibers the cells and fibers being arranged in the lines of tension

We see this in cases of fracture of the patella and fracture of the olecranon process in which the fragments have been placed in apposition by wire or nail but which are separated gradually by muscle pull

We have observed the same arrangement of the uniting

Comparing the results of experimental excisions in cases in which bony union occurred with the results of excision of the human knee joint as interpreted by roentgenograms we find that where the bones were maintained in close apposition bony union occurred between the entire extent of the apposed surfaces (Compare Figs 290 and 292 with Fig 293)

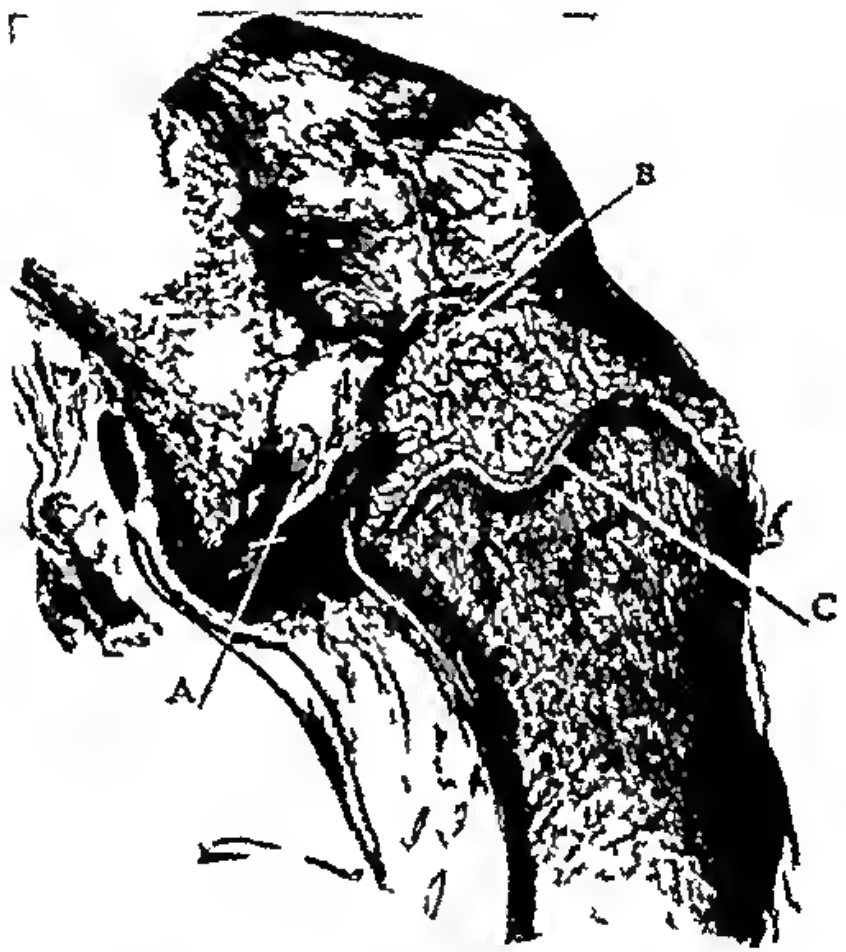

Fig 294.—*A* A f gr wth fd eavascul fib u t th b dles of wh h n paralf l to th sawn u f e f th bo I t m l t th small l ght sta d a a f cart lag nde g g o fic t f m t ppe f m ral d Abo th th m rr w pa pen el whe bo b tt s pa t m rr w pa f m fib u t *B* O u u *C* ep phy l cart l g

On the other hand where close apposition was maintained between a portion of the sawn surfaces only with separation of the remaining portion we find bony union in the former area and fibrous union in the latter (Compare Fig 294 and Fig 295)

In the portion united by fibrous tissue a new bone buttress is formed which separates the marrow spaces from the uniting fibrous tissue (Fig 294)

Comparing the classic square or plane mode of knee joint excision with the concavoconvex method we note the following

Plane mode While it is easier to remove the bone ends by this method, it is often difficult to saw them in the proper horizontal plane so as to get a uniform contacting surface with the leg in proper weight bearing relation to the thigh

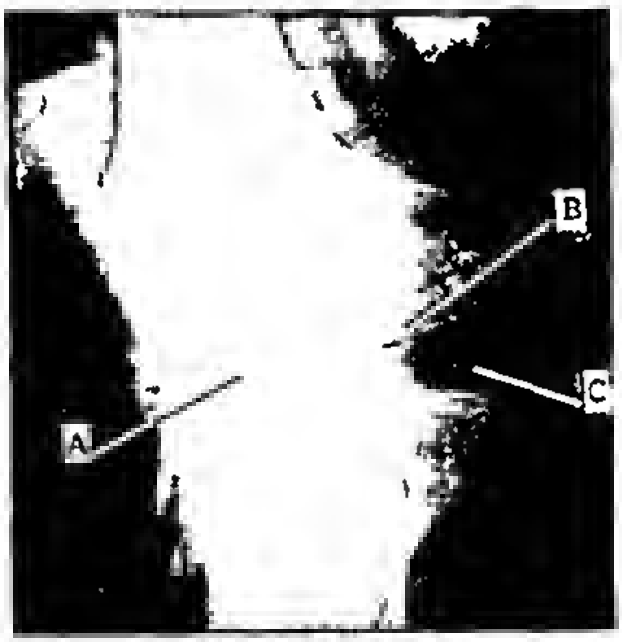

Fig 295.—Excision by plane mode *A* Bony union *C* fibrous union *B* bone buttress separating marrow spaces from fibrous tissue

If this is not accomplished and the sawn surfaces are brought in close apposition a valgus or varus malposition occurs (A few degrees of flexion gives a slightly better cosmetic as well as functional result than that produced by an absolutely straight limb)

If the leg and thigh are now placed in the position most suitable for weight bearing there will be a triangular gap with base directed anteriorly posteriorly laterally or mesially (Fig 295)

As the sawn surfaces of the bone are not equal in extent they

tend to slip past each other To prevent this nails have been used With this method more bone is sacrificed than is necessary

Concavoconvex method This method requires a little more care in the sawing of the bones but it gives a uniform contacting of the entire bony surfaces regardless of slight degree of flexion or extension of the leg or the thigh (Fig 293)

The sawn ends of the bones are prevented from slipping past each other and a minimal amount of bone is sacrificed

Operation —Several incisions have been used to obtain access to the articular surfaces of the knee joint each having some special object in view

The lateral incisions internal (v Langenbeck s) and the external (Kocher s) aim to preserve the extensor apparatus but as they do not permit of easy access to all portions of the joint they are limited to cases of partial excision in which a movable joint is anticipated

The transverse incision (Volkmann s) across the joint over the middle of the patella followed by division of the bone gives excellent exposure of the joint structures but this incision and the upper curved incision (Hahn s) possess no real advantage over the lower curved incision (Textor s) which we use

Where bony union is sought it is not only immaterial whether or not the patella is divided but in most cases it is well to remove it

With the knee flexed and the sole of the foot resting on the table a curved incision is made extending from the posterior part of one tuberosity of the femur to the corresponding point on the opposite tuberosity the lower and midportion of the incision crossing the ligamentum patellæ at about its center

The incision is carried down through the ligamentum patellæ and capsular ligaments through its entire extent and the patella is raised in a large U shaped flap

Bleeding points are caught and ligated The tense crucial ligaments now come into view these are cut across close to the condyles

The femur and tibia are now easily separated and the posterior portion of the joint readily examined

The lower end of the femur can now be projected through the wound

The patella is excised or its posterior or articular surface is sawn off

Removal of the synovial membrane is done by knife dissection supplemented by scissors curved on the flat The infrapatellar pad of fat with synovial membrane covering its upper surface is first removed dissection is carried upward and the synovia

Fig 296—Excision by plane mode for chronic arthritis non tuberculous showing bony union over practically entire extent of sawn surfaces.

covering the deep surface of the quadriceps on either side of and above the patella including the anterior wall of the sub crural bursa to the upper limit of the bursa is removed

The synovia of the posterior wall of the bursa with the subsynovial fat is now dissected off the supratrochlear portion of the femur and that covering the lateral aspects of the condyle, which is more closely adherent to the bone as well as its reflection on to capsule is removed

The head of the tibia is drawn forward the remnants of the

tend to slip past each other To prevent this nails have been used With this method more bone is sacrificed than is necessary

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The femur and tibia are now easily separated and the posterior portion of the joint readily examined

condyle and the lower surfaces of the condyles lie in the same horizontal plane when the patient stands erect

It follows therefore that the femur must be sawn in a plane parallel to the undersurfaces of the condyles If this is not done too much bone is apt to be removed from the internal condyle so that when the bones are brought into apposition there is an inclination of the tibia inward

To correct this more bone must be sacrificed

The head of the tibia is now drawn forward and sawed across in a concave manner from front to back there being no danger to the structures in the popliteal space as they lie some distance from the posterior margin of the articular surface

The two sawn surfaces are examined and any remaining foci of disease are removed with a curet

If the bone section has been made accurately the sawn surfaces fit exactly

The remaining synovial membrane in the posterior portion of the joint including that which lines the pouches behind the remains of the condyles is removed

Oozing is arrested by pressure with gauze wrung out in hot saline

It is essential that all bleeding shall have stopped before closure of the wound

With the bones in the acutely flexed position the posterior ligament is shortened by four mattress sutures of kangaroo tendon The leg is now extended and the wound is closed by suture of the capsule and ligaments with overlapping of the patella tendon The skin and subcutaneous tissue are sutured and the wound dressed with gauze

A circular plaster of Paris dressing is applied from groin to foot and a fenestrum made over the incision

This is replaced after six weeks by a brace and the patient encouraged to bear weight The brace is worn until union is solid

We do not use the Esmarch bandage during operation because of the increased oozing which follows its removal

In excision for arthrodesis especially in the young care must

be exercised not to injure the epiphyseal cartilage In these cases the cartilage and bone buttress may be removed by chisel Hibb s operation for stiffening the knee joint is preferable to excision in these cases

In excision for ankylosis in deformity care must be taken not to wound the structures in the popliteal space either when dividing the bones or when correcting the deformity To protect the structures in the popliteal space the soft parts are separated around the lateral margins of the tibia and a narrow spatula inserted The bone is sawn to a position near the posterior limit of ankylosis and by flexion the remaining bone is fractured

The bone ends are now treated as described above Sufficient bone must be removed to permit straightening without undue tension of the structures of the popliteal space

Especial acknowledgment is made to Dr Frank E Blaisdell for his work in preparing the photographs for this article

CLINIC OF DR JOHN HOMER WOOLSEY

UNIVERSITY OF CALIFORNIA HOSPITAL

GASTROJEJUNAL AND JEJUNAL ULCER CAUSE DIAGNOSIS, TREATMENT

Case I —J A is a Portuguese ranchman thirty eight years of age and enters the hospital complaining of abdominal pain on lifting or accompanying heavy work He was operated upon nine months ago by another surgeon who writes as follows I made an exploratory incision performed a gastro enterostomy posterior no loop appendectomy There was no carcinoma but evidence of ulcer of pylorus '

Present Illness —His family and past history are of no importance Previous to his original laparotomy the patient s complaint was pain in the epigastrium after meals frequently accompanied by vomiting There was a gradual increase in severity of all symptoms until he was unable to take solid food Subsequent to the initial gastro enterostomy the patient was comfortable for a period of approximately six months He states that his recovery from the operation took five to six weeks and that a drainage tube was left in the wound for two weeks

Three months ago while lifting an object he felt a sharp non radiating pain in the region of the incision which persisted to such a degree that he remained in bed for two to three days He has had this same pain return with any exertion so that he has discontinued his work A letter from a local Social Service worker states The patient has not worked since the last operation He has never noted any relation to meals or relief by any measure except rest Two weeks ago he had a diarrhea for two or three days and he reports that his stools contained blood

Physical Examination—A well developed and nourished male ambulatory not ill looking speaks and understands English with considerable difficulty and does not observe keenly The essential findings are the poor hygiene of the teeth with pyorrhea of a severe degree enlarged non tender operative upper right rectus scar 3 cm broad at the center and apparently attached to some underlying structures as noted by its depression with respiration no point of abdominal tenderness and liver edge spleen and kidneys not palpable

Laboratory—The urine showed a faint possible trace of albumin but was otherwise negative

The blood picture is Hgb 90 per cent red blood cells 5 620 000 white blood cells 7200 differential Polys 63 per cent S M 29 per cent L M and T 5 per cent E 3 per cent

The stool examination with a controlled diet shows on repeated occasions no fresh or occult blood present

The gastric functional test meal shows a benzidene test faintly positive all specimens tinged with bile except the first and second a total acid from 15 to 38 and free HCl 5–18

The blood Wassermann is negative

x Ray—Fluoroscope examination is as follows The lung fields clear Right diaphragm rather flattened Heart and arch O K Esophagus negative Stomach good position no peristalsis seen empties rapidly through gastro-enterostomy There is a slight barium residue in the first loop of small intestine clinging to walls possibly due to ulceration There is a small amount of emptying through pylorus The antrum just inside pylorus shows a fairly large defect Conclusion Functioning gastro-enterostomy—question ulcer in jejunum Lesion in antrum

Discussion—The history of abdominal pain in the region of the operative scar occurring with any muscular effort and relieved by rest suggests some mechanical cause resulting from the former operation This might be from intraperitoneal adhesions of some viscera to the operative wound but unless some other complication as a local hemorrhage partial strangu

lation of the bowel volvulus or some condition equally severe has ensued it would not with any probability have remained for two to three days steadily and would not have prevented the average man from performing some work during the past three months There is no sign of a hernia in the operative wound or in the actual openings from the peritoneal cavity Tension on the omentum in an inguinal or femoral hernia will often be referred to the epigastric region entirely

The fluoroscopic examination has revealed the possibility of a jejunal ulcer but there is no clinical data to substantiate this except the knowledge of a previous gastro enterostomy

The patient interprets his symptoms poorly and carelessly—always in relation to work He claims to be industrious and has a large family to support Since he suffers so severely as to prevent his return to work it seems justifiable to recommend an exploratory laparotomy

The preoperative diagnosis of intraperitoneal adhesions is decidedly unsatisfactory but the clinical history which is so important in such a postoperative course as this does not suggest any gastric or intestinal participation

Operation—An upper right rectus incision 15 cm long is made medial to the former incision and developed through to the peritoneal cavity Well developed adhesions are present between the transverse mesocolon and the former operative scar but are easily separated without need of hemostasis A few fine adhesions between the gall bladder and liver and the duodenum are separated A soft scar is seen just to the duodenal side of the pylorus but there is no thickening of the wall no enlarged lymph glands and no signs of an old ulcer on the gastric wall The pylorus has the normal patency The exposure of the gastro-enterostomy site beneath the transverse mesocolon is effected with difficulty as you see from adhesions These are abnormal and suggest active pathology The entire gastro-enterostomy stoma margin is thickened especially at this point where there is an indurated area 1 cm in diameter with a crater like center The jejunum itself is normal This is a so-called marginal ulcer and the induration throughout the gastrojejunal junction sug

gests some irritating object that has affected the entire circumference of the stoma

It has been found by experience that *no* local plastic measure is of avail Excision of the gastro-enterostomy and restoration of the original tract is the only effective treatment The transverse mesocolon is therefore separated from its attachments to the stomach wall watching closely that the middle colic artery which you see lies just to the right of the gastrojejunos

Fig 298—Gastro-enterostomy stoma with wing attached Instead gastrojejunal ulcer

tomy is not injured Now that the stomach is entirely free it is opened holding up the wall with Allis forceps as we proceed The large blood vessels in the gastric wall are ligated with black silk No B (these will be completely turned in with the closure) as a prophylactic measure against postoperative hemorrhage The stomach is now closed with two layers of chromic catgut No 2 and the opening in the transverse mesocolon closed and sutured over the closure of the former gastric stoma You

observe that the excision of the jejunum is close to the gastro jejunal margin This is done with the desire to preserve as much of the circumference as possible for a plastic closure No ligation of vessels in the jejunal wall is necessary The two antimesenteric borders of the jejunum are approximated and the closure is made with two layers of chromic catgut No 1 employed in

Fig 299 —Gastrojejunal ulcer with strand of black linen across its base

the form of continuous Lembert stitches respectively Over the closure this tab of fat is attached with plain catgut No 00 so as to prevent the occurrence of adhesions This concludes the operation except for the closure of the abdominal wall

Pathology —The specimen (Fig 298) is most interesting for it illustrates what many surgeons claim does not occur You observe this loop of black linen suture which had dangled in the

jejunum where food could catch in it The fluoroscopic picture of barium residue in the first loop of the small intestine clinging to the walls was due undoubtedly to the barium adhering to this suture You observe that the entire circumference of the stoma is raised and approximately 0 5 cm thick whereas it should be as soft and pliable as the ordinary gastric wall At the opposite side you see on the gastric side a crater effect 0 5 cm in diameter and if you look closely (Fig 299) you see running across its base a portion of the black linen suture This is an ulcer of some duration It has a hard indurated border and a

Fig 300—Cross section of the edge of the gastrojejunal stoma showing the black linen suture on the posterior aspect

fresh eroded appearance at its base signifying activity In the cross section (Fig 300) at two points of the specimen you observe the suture is apparently the external or deeper suture The conclusion is obvious then that this is a marginal gastrojejunal or so called marginal ulcer due primarily to a non absorbable suture

Subsequent History—This patient returned to his usual work three months after operation Six months after operation he reports that he is now enjoying the best of health eats the same food as the remainder of the family and considers himself cured

Case II —The second patient L A an Italian male aged thirty five years, employed in a clerical capacity entered the hospital on a stretcher, complaining of severe abdominal pain and vomiting His family and past history are unimportant

Present Illness —At twenty one he observed for the first time abdominal symptoms characterized by constant pain most marked shortly after eating in the umbilical region At twenty five and a half he had attacks of vomiting three to four days in duration fifteen to thirty minutes after meals not associated with pain and coming at intervals of several weeks At twenty six he had a sudden severe epigastric pain, followed by collapse, for which be was operated A perforated gastric ulcer 2 cm from the pylorus, was closed He had an uneventful recovery but continued to have a burning gnawing pain one to two hours after meals relieved by food

Four months after the emergency operation he was again operated by the same surgeon, who excised a scar like area near the site of perforation and performed a posterior gastro enterostomy This was followed again by a burning epigastric pain two to three hours after meals, relieved by food

Eight months later due to moderate hematemesis and vomiting he was again operated by another surgeon The gastro-enterostomy stoma was found to be patent and soft A scar in the region of tbe pylorus was observed and a pylorectomy was performed Later examination of this excised tissue showed no pathology

One month after operation he returned witb the old complaint, accompanied by marked belching and early signs of gastric tetany He improved under rest and dietary measures He followed as far as possible at his boarding bouse a special diet which gave him partial relief from the abdominal pain and only rare vomiting

Three years after the last operation he bad bospital treatment for a severe hemorrhage by mouth and rectum One year later there was a recurrence of the bleeding and the patient again entered Rest and dietary measures were once more effective For the following two years he had much gaseous distention

The stomach is normal in size and tone and the lesser curvature free from all sign of inflammatory reaction As the transverse colon and omentum are raised you observe that the underlying intestines are injected but not distended and here and there are plaques of lymph There is a large amount of the plastic exudate in the region of the gastro-enterostomy Three centimeters below the gastro-enterostomy on the antimesenteric border of the jejunum is an indurated area 1 5 cm in diameter and associated with this a constriction of the intestinal lumen from the inflammatory cicatricial reaction Over the center of the indurated area is a large plaque of lymph and under this is found a small hole through which bile stained fluid now oozes This is a perforated jejunal ulcer of considerable duration and in addition to the usual symptoms it has given a partial obstruction of the intestinal lumen

For reasons that will be discussed later it is found best to excise the gastro-enterostomy and its pathology and allow the course of the food to assume its normal route Because of the former pylorectomy we have an additional difficulty and therefore the possibility of a gastroduodenostomy must first be determined By pulling the second portion of the duodenum markedly to the left the peritoneum laterad to it is exposed This is now incised and by blunt dissection with the finger the duodenum is *mobilized* sufficiently to approach the *midline* by approximately 5 cm over that of its original location The distal end of the stomach is dissected free and with a technic similar to that of the Finney pyloroplasty the end of the stomach is anastomosed to the side of the duodenum Chromic catgut No 2 is employed in two layers for the anastomosis Three additional mattress-sutures of chromic catgut No 1 are placed over the ventral side of this union and then some local omental tissue is attached in such a manner as to cover the anastomosis The gastrojejunostomy stoma together with the portion of ulcer bearing jejunum is excised with the cautery cutting across the jejunum on the distal loop above the Payr crushing clamp and on the proximal loop below the Payr crushing clamp The transverse mesocolon attached at the former operation is now

separated from the stomach wall By holding up the stomach wall with Allis forceps to prevent leakage of gastric content the gastrojejunostomy stoma is cut free and removed The stomach is now closed with two layers of chromic catgut No 2 sutures the inner layer according to the continuous Connell suture and the outer a continuous Lembert The opening in the transverse colon is closed with interrupted plain catgut No 1 The end of each jejunal stump is now closed over the Payr clamps by the right angle Cushing suture With the removal of the clamps the suture is pulled taut and automatically inverts the intestinal edges A second suture of continuous Lembert reinforces the initial Cushing suture layer A lateral anastomosis while theoretically not so good but practically more certain to function in the majority of instances is now performed between the two portions of jejunum Two layers of chromic catgut No 1 in the usual method are employed and a few tabs of local fat attached to cover the line of anastomosis The abdomen is then closed without drainage according to the method described by Searls

Question—What anesthesia are you employing?

That is a combination of nitrous oxid oxygen and ether Ether has been administered only at the start and finish for purposes of relaxation The nitrous oxid and oxygen all during the stomach and intestinal surgery has not irritated the respiratory tract and has not destroyed hemoglobin as ether does You will also observe that coincidently with the operation a hypodermoclysis of 1000 c c Ringer s solution (because of the dehydration of the patient and the length of the operation) has been given in the thighs

Pathology—The specimen consists of the gastrojejunostomy stoma of a small portion of the proximal loop of the jejunum and approximately 6 cm of the distal loop of jejunum The edge of the stoma is as soft and normal as the gastric wall itself At this point approximately 5 cm below the gastrojejunostomy stoma is a perforation 0 25 cm in diameter and about it is an indurated thickened jejunal wall extending for three quarters the circumference of the intestine Upon opening the intestinal

lumen the indurated thickened area is seen to have a crater like center 0 5 cm in diameter with absent mucosa and an indurated jejunal wall covered with edematous mucosa The mesenteric side of the jejunal wall and its mucosal membrane are uninvolved The remainder of the jejunum is normal This is a jejunal ulcer secondary to gastrojejunostomy and has been present for some months at least From the history of clinical symptoms the negative findings at the third operation and continuance of symptoms thereafter one would be justified in concluding that this jejunal ulcer has been present ever since the gastrojejunostomy nine years ago and was the probable cause of all the symptoms The patient s future course may or may not substantiate the conclusion and so will be observed with special interest

He was advised to follow a soft diet and to use alkalies for any burning pain He was also advised that the teeth should be properly attended to and the tonsils removed

Subsequent History—The patient had his tonsils removed and his teeth properly repaired He has had recurrent attacks of distention with gas marked belching and at one time a three weeks period of a burning epigastric pain relieved by alkalies By *x* ray examination no six hour residue has ever been observed and no definite signs of any ulceration The patient has been working 50 per cent of the time since his operation and at present one year later enjoys the best health for the past ten years

Diagnosis—Gastrojejunal and jejunal ulcer are prone to occur subsequent to approximately 3 per cent of gastrojejunostomies The symptoms may start immediately after the patient is up and about from the operation as they did apparently with patient No 2 or they may start years later As a rule however the first clinical symptoms are within four months from the operation The recurrence of all the former symptoms but not so periodic and not so severe is the usual finding A burning gnawing pain occurring one to three hours p c relieved by food or alkalies and somewhat by rest and as a rule referred to a point left of the umbilicus is most suggestive With this the

patient may have occasional vomiting persisting for one to two days Hemorrhage with a negative history for this previous to operation is strongly indicative of this type of ulcer With such an ulcer fresh blood may be vomited and occult blood will always be found in the stools

Physical examination is of value in some instances Many patients have tenderness across the entire epigastrium but a point of tenderness emphasized by Terry located 2 to 4 cm to the left of the umbilicus is more characteristic A palpable tumor mass just to the left of the umbilicus is sometimes observed Test meals are as a rule of no advantage Roentgen ray examination is of value in a corroborative manner Ruggles notes the Roentgen evidence of gastrojejunal ulcer as follows

1 Persistent irregularity in the region of the stoma

'2 Constant spasm in the stomach wall opposite either margin of the stoma

3 Six hour residue in the stomach or jejunal loop

4 Gastric hyperperistalsis

Of these the most significant is the deformity of the outline of the margin of the stoma or proximal portion of the jejunum which is constant in all positions of the patient and upon repeated examinations Spasm in the stomach wall opposite the margins of the opening when present is a very great help in establishing the diagnosis Unfortunately these contractions are not always evident even when the extensive ulceration exists They are usually seen when the gastric mucosa is involved Jejunal ulceration alone causes localized spasm in the jejunum which is a factor in the production of the deformity noted above Residue in the stomach or jejunum and hyperperistalsis are only indirect evidences but when both are found ulceration is to be strongly suspected

Etiology —The cause of gastrojejunal and jejunal ulcer secondary to gastro-enterostomy is not definitely known There are however two main theories one that it is due to the acid gastric secretion pouring directly on the jejunal mucosa the other that certain mechanical trauma is the basis As regards the former it is interesting to note that but two primary jejunal

ulcers have been reported and they were syphilitic in one instance and probably so in the other Only a few cases have ever been reported subsequent to gastrojejunostomy for cancer of the stomach The majority have occurred by far following operation for gastric or duodenal ulcer and the greater proportion of these have been associated with instances of a wide open pylorus The bolus of undigested food passing over the area the acid medium or the lack of the usual alkaline medium by which the pepsin may act directly on an injured jejunal mucosa are important factors according to many of the leading gastro enterologists today Mechanical trauma from pressure of the clamps so commonly used in gastro-enterostomy is considered evident for in many instances the ulcer has occurred exactly where the clamp pressure was applied Pressure necrosis with a resultant infarct is supposedly the result It is possible that the jejunal ulcer of Case II is an example of this Hematoma from the trauma of the needle with a lowered local resistance and infection added as a secondary factor is another probable cause The non absorbable suture is a known common cause and yet many surgeons continue to employ it One has only to read the literature to find that every one of experience is convinced of this Gronnerud reporting experimental work on 4500 animals says The noteworthy frequency of peptic ulceration following the use of silk sutures and the almost total absence of this sequela after the catgut anastomosis convinced us that here was the etiology of this after effect It is of interest to note in the first patient that it was the outer suture that had caused an ulcer at one point and had penetrated into the intestinal lumen at another point

Treatment —The preventive treatment for jejunal ulcer subsequent to gastrojejunostomy is of first importance Strict attention to the diet and the employment of alkalies for a proper period of time dependent upon the condition found are essential The eradication of all foci of infection especially those of the tonsils and teeth are equally essential Medical treatment after the ulcer has occurred is in the majority of instances palliative only

Surgery is the choice Any plastic on the gastrojejunostomy itself for a jejunal or gastrojejunal ulcer is of little or no value for there is a high proportion of recurrences with such treatment If such an ulcer occurs it is best to completely undo the gastro jejunostomy, excise the jejunal ulcer and re establish the normal circuit The chromic or tanned gut suture with the type of needle in which the suture is indirectly fastened (swedged) in the needle is the best Permanent suture material, as linen or silk is unnecessary and should never be employed

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CLINIC OF DR ALANSON WEEKS

SURGICAL DEPARTMENT UNIVERSITY OF CALIFORNIA
ST LUKE'S HOSPITAL

LARGE INTRACAPSULAR HEMORRHAGE OF THE LIVER

THIS patient was referred to us from the medical side with the following important points in his history

He is a cowboy by occupation and was in the American Army in France and gives a history of having been gassed while in the Argonne battles but not badly enough to necessitate sending him to a hospital In November 1918 he had a diarrhea for several weeks and lost about 25 pounds at that time Since then he has had several attacks of diarrhea

One month and a half ago he was riding in a rodeo in the state of Washington and while bull dogging a steer as he threw himself from the back of his horse to seize the steer by the horns his partner who was riding behind to keep the steer on the run was unable to stop his horse and ran into the patient and the steer In the struggle the right horn of the steer was broken off and the horse's feet struck the patient in the back and right side breaking 4 ribs in front just behind the right costal arch In spite of all this the patient threw his steer and was able to get up and walk off the track into the center resting area He thought at the time that his right arm was broken because of the pain in it He sat down for about fifteen minutes and upon attempting to get up his wind was suddenly shut off and he could not walk but fell in a heap After a second attempt to get up he was carried to a tent and laid down for about four or five hours and then taken to a hospital where he states he was kept quiet under dope He passed blood in his urine for two days and nights He remained in the hospital for two weeks and

two days being up and down and left the state of Washington for Los Angeles California in an automobile On the way down he had spells and great pain in his right hip prevented him from walking or sitting It was necessary to stop in a hotel for one week and rest

Upon entering St Luke s Hospital his blood count was 55 per cent hemoglobin and 3 800 000 reds 10 000 whites with 76 per cent polys The blood count today showed 16 800 polys Urine examination upon entering the hospital was negative Twenty four hour specimen two days after entering the hospital was negative except for a few red blood cells Examination of the urine yesterday showed considerable albumin with many red blood cells

The cystoscopic examination with catheterization of the ureters showed

	Right	Left	Mixed
Phthalein	0	30 per cent	
Urea	0 2 per cent	0 2	
Red blood cells	xxx	0	x
White blood cells	xx	0	0

A guinea pig was inoculated subcutaneously with urine and was killed and autopsied The findings were normal

Blood Wassermann was negative

x Ray examination showed a small amount of fluid in the pleural cavity some of which was aspirated and found negative

It is perfectly evident from the appearance of this large man that he has lost considerable weight that he is markedly anemic and by the expression of his face that he is in distress

Inspection of his abdomen shows it to be markedly protruding on the right side Palpation shows a mass exactly the shape of a very large liver which practically fill the right side of the abdomen

Our diagnosis of his original injury was rupture of the liver and right kidney with a large hematoma which we now think is subdiaphragmatic and may be infected The Chief of Medicine calls our attention to the fact because of his history of possible amebic dysentery even though the stools are negative

for ameba, now that an amebic abscess of the liver must be considered

We are making an incision parallel to the right rib margin with the idea of draining a subdiaphragmatic abscess As we open the peritoneum which is freely movable over a mass beneath you will see the liver which is of a very dark red color

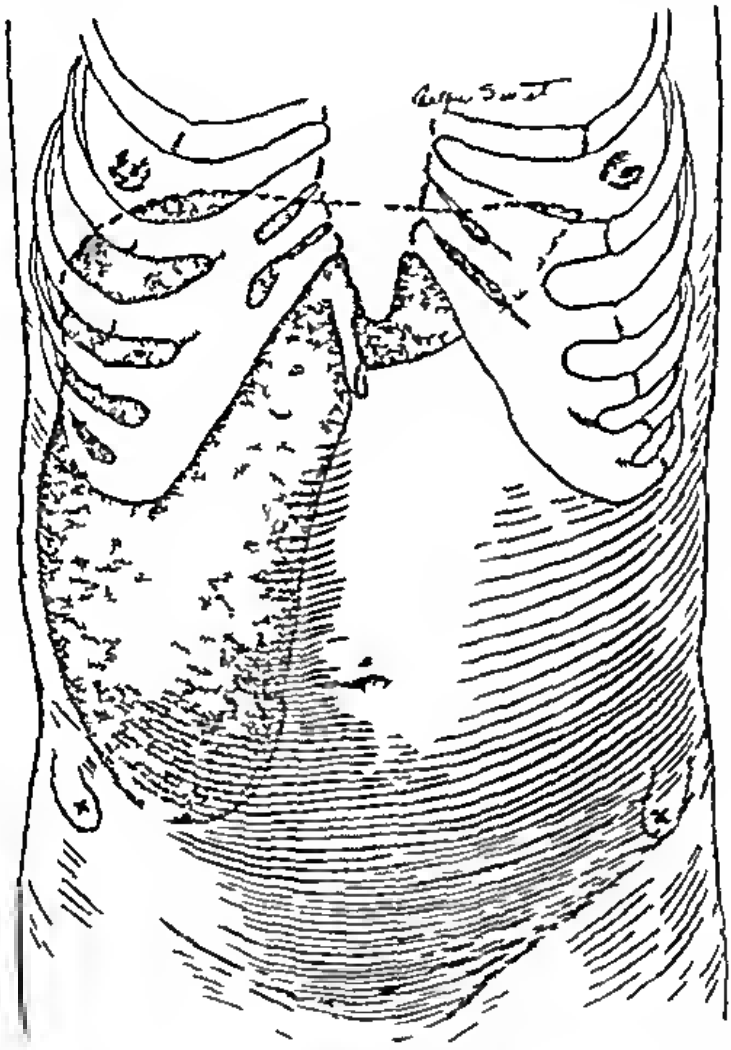


Fig 301 —Diagrammatic appearance of enlarged liver at time of operation

As we enlarge the incision reaching up under the diaphragm we meet with no adhesions We are able to pass our hand all about an enormously enlarged liver with no adhesions anywhere There is no abnormal mass in the region of the right kidney By palpation of the liver at the site of the wound fluctuation is distinctly felt We insert a trocar with tube attached and

immediately you see a straw colored fluid come out under marked pressure We have removed what looks to be more than 1000 c c and the anesthetist informs us that the patient s pulse has jumped from 110 to 140 Because of the possibility of a secondary hemorrhage on relief of pressure we will clamp the tube and leave the trocar in packing the wound open We will remove the forceps and allow gradual drainage later

Postoperative Notes —The patient s temperature which for a few days had been a degree above normal gradually returned to normal as al o did his pul e after a week s time

The fluid which was removed from the liver and saved at the time of operation measured 1500 c c of old blood serum We lost at least 100 c c on the table and are satisfied that at least another 1000 c c was drained from the liver during the following few days

The red blood cells in the urine gradually cleared and had disappeared when the patient was last seen He made a rather rapid recovery from his shortness of breath and discomfort

This case was reported because of the unusual rupture of the liver within its own capsule causing a hemorrhage large enough to incapacitate the patient very soon after he was injured and also because he suffered which is also unusual a rupture of both the right kidney and the liver apparently within their capsules at the same time

GALL STONE OBSTRUCTING SMALL BOWEL

This patient gives the following history

She was born in Finland and is sixty four years of age She does not remember having any illnesses as a child She married at the age of twenty three years and had 5 children the first of which was a forceps baby and weighed 14 pounds After the birth of this child she remained in bed ten days She remained in bed after the birth of the other 4 children only seven days for each

She does not remember any real serious illnesses of any kind but does remember that about six years ago she had some pain in the right side of her abdomen for which she did not go to bed Six months ago she had this same uncertain pain in the right side of her abdomen when she vomited three days and remained in bed eight days because the doctor made her do so not because she felt she needed to

Four days ago she was again taken with this pain in the right side the locabzation of which is very indefinite and started to vomit She vomited until now When I first saw her half an hour ago her vomitus was distinctly fecal material

Strange to say her general appearance with a not unduly rapid heart is out of all proportion to our diagnosis of obstruction of the bowel She does not have the anxious appearance or the rapidity of the pulse which one would expect with such a condition On account of her age our first impression would be that she is suffering from a probable malignancy causing the obstruction but because of the fecal vomiting it is evident that the abdomen must be opened

We are making a midline incision of considerable length because we believe that the larger the incision the quicker the inspection and the lessening of the danger to the patient from abuse of tissues You will notice that the large bowel does not present as one would expect should the obstruction be in the

lower part of it but here we do see numerous coils of small bowel considerably distended As we pass our hand down and around we come upon what feels like a large spindle which is freely movable in the lower abdomen and here we deliver a coil of small bowel and a hard spindle shaped mass within its lumen You will notice that the mass is reasonably freely movable within

Fig 302 —Appearance of bowel with c t ed gall sto

the bowel We shall endeavor to work this mass toward the cecum It can be seen that we are near the end of the ileum As we push the foreign body along we find that it is stopped by an abnormal attachment of the mesentery to the posterior abdominal peritoneum Upon more careful inspection it is discovered that we are within 2 feet of the end of the ileum Our

safest procedure now is to make an opening into the intestine and deliver the mass which is done We are closing the opening with a double row of catgut

In spite of our efforts to pad off and protect the intestine from leakage a small amount has escaped The intestine is returned to the abdomen the large bowel inspected and no other abnormality can be found No other examination is deemed necessary and the abdomen is closed with drain through the peritoneum

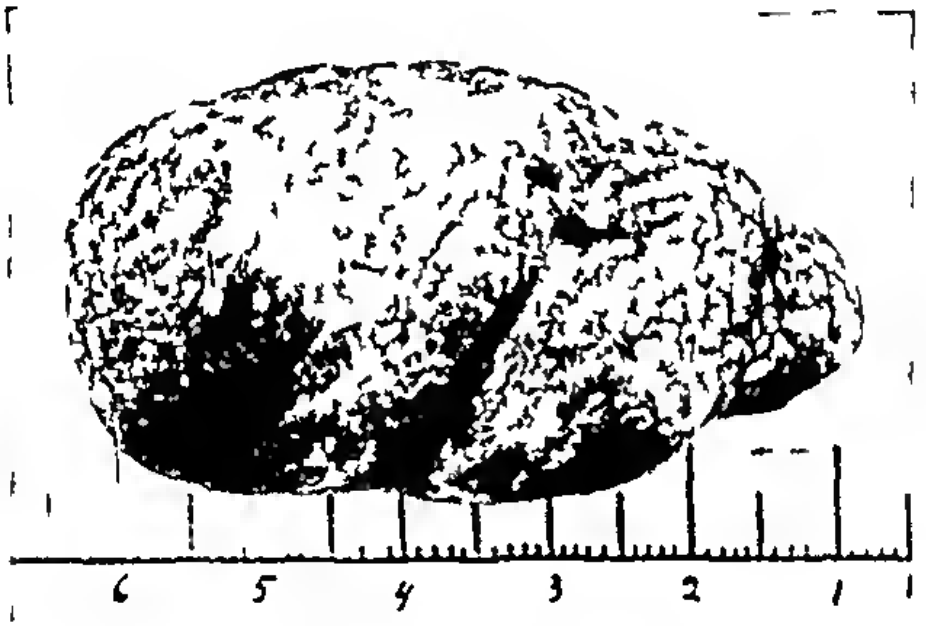


Fig 303 —Gall stone Side view

The mass delivered from the intestine we believe to be a gall stone

Postoperative Notes —The patient's bowels moved freely within forty eight hours and there was no further vomiting On account of the leakage from the small bowel there was a marked infection of the whole wound which took some weeks to close There was however no fecal fistula

The specimen measured 5 4 cm in length 2 9 cm in greatest diameter

Weight 10 grams

Color Grayish mottled with yellow

He tied both vessels The man recovered but died four months later of pulmonary tuberculosis Orth s report is short and the anatomy of the injury is not made quite clear v Haberer[5] treated an arteriovenous aneurysm of the common iliac and the inferior vena cava by suture Moncany[6] reports an aneurysm diagnosed as originating from the common iliac The man was not operated upon and the diagnosis is open to doubt Ranzi s[7] paper contains 5 histories of iliac aneurysm but these 5 are all probably aneurysms of the external iliac artery

In the recent literature there are a few reports of spontaneous aneurysm of the common iliac Haythorn[8] found at the autopsy of a man who died of biliary tuberculosis a small tuberculous aneurysm of the common iliac which contained a caseous thrombus Maurel reports a common iliac aneurysm DiPoggio[10] another a syphilitic one

I can find reported no case surviving operation for true aneurysm of the common iliac artery The rarity then of aneurysms of this vessel should justify presenting our patient

Mr D an American sixty years of age came to me on November 17 1922 As a boy he had been seriously ill with scarlet fever he bled from his kidneys for two or three weeks at this time He had also had ozena as a boy and had been troubled with his nose and throat all his life In 1893 he had a mild attack of grip

He had coughed more or less for many years and at times had brought up some blood Dr Harold Hill who saw him some five or six years ago had demonstrated tubercle bacilli in the sputum For many years however he seems to have carried his pulmonary infection innocently about with him He smoked drank a clubman s quota of alcohol and kept late hours with no apparent harm either from his mode of living or from the disease of his lung His tuberculosis was evidently of a chronic fibrous type

He had had no other infectious diseases—no typhoid no malaria no dysentery and no venereal disease Several Wassermann tests had been negative

He had always been robust and vigorous and indeed still

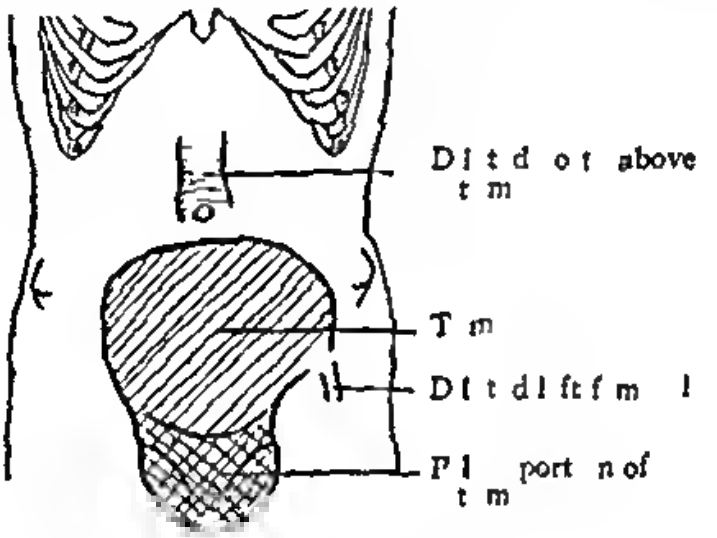
was so in spite of the pain and sleepless nights that his enormous aneurysm had lately caused

In 1918 four years before I saw him he had some abdominal pain but attributed it to gas and paid little attention to it, his abdomen was not distended A month or so after the onset of the pain he was attacked suddenly while driving downtown in a taxicab with violent pain in the left groin He ordered the driver to return home and getting out of the cab fainted on the threshold of his house His family physician Dr Herzstein was called who took him to a sanitarium In a few days his abdomen became enormously distended with gas but under medical treatment the distention gradually receded Two surgeons were called in consultation and told Mr D that he was suffering from a diverticulitis having noticed a swelling of the left lower abdomen and left groin Dr Herzstein auscultated this swelling but could hear no bruit There may have been a degree or so of fever but not more During the first day the patient could not pass his urine and was once catheterized after this he had no trouble with his bladder There was no blood noticed in the stool

The patient was in the hospital for a month when he got up and felt fairly well A month later the left leg suddenly began to swell without fever and without pain He returned to the hospital for about a month but when the swelling did not recede he took matters into his own hands and had his leg baked and massaged by a masseur The swelling gradually disappeared and he felt fairly well for about three years except for occasional pain in the lower part of his back affecting both sides equally

In July 1922 during a long drive over rough country roads the pain in the back increased On arriving at his destination he sat up all night By the next day the pain was so severe that he had to return to town He went home and to bed About three days later Dr Herzstein saw him and noticed for the first time after giving him a physic that the stool contained large amounts of mucus The patient suffered from constant tenesmus and a feeling of pressure over the bladder the end of micturition

was difficult A few days later his nurse noticed a black discoloration of the perineum which gradually spread until his hips and flanks were black and blue At the same time he again noticed a swelling in the left lower abdomen extending farther toward the midline than had the swelling of three years previous An *x* ray of the colon showed a low obstruction diagnosed as probable carcinoma The surgical consultant said that the mass which he had felt at the former examination had increased in size and recommended laparotomy The patient did not accept operation and went back to his masseur The abdominal distention the feeling of pressure in the rectum and



F g 305—T m a palpat d bef operat

bladder continuing he sought my advice The previous week both legs had begun to swell the swelling was greatest at the end of the day and disappeared after rest in bed The patient was inclined to attribute the onset of the last attack of abdominal pain and swelling of the legs to a troublesome cough that accompanied his first attack and had continued at intervals since He felt rather tired but less so than when being purged he suffered moderate dyspnea on exertion he was about 15 pounds underweight Urinary frequency had continued he got up about every two hours during the night He took two *x* ray treatments for his tumor but had a severe reaction after each of them

I found Mr D to be a well nourished robustly built man His temperature was 97 8 F his pulse 80 the wave was di crotic blood pressure 146 systolic

The fingers were a little cyanotic The lungs at various examinations showed diffuse dry crackling râles The apex of the heart lay about ½ inch to the left of the left nipple the right border 1 inch to the right of the sternum There were no mur murs Both legs were edematous

The lower half of the abdomen protruded the upper half was rather drawn in Both flanks bulged a little A sharp and smooth liver edge could be felt coming down about an inch under the ribs The spleen was not palpable

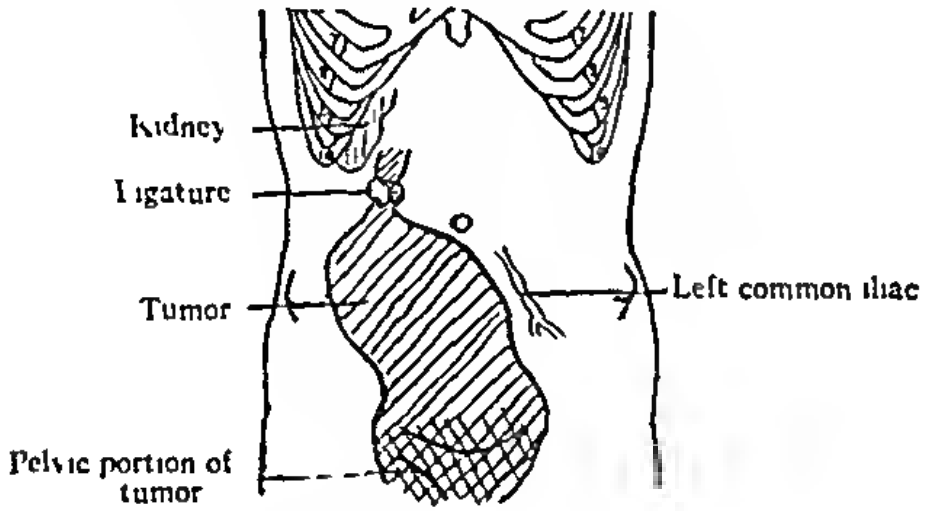
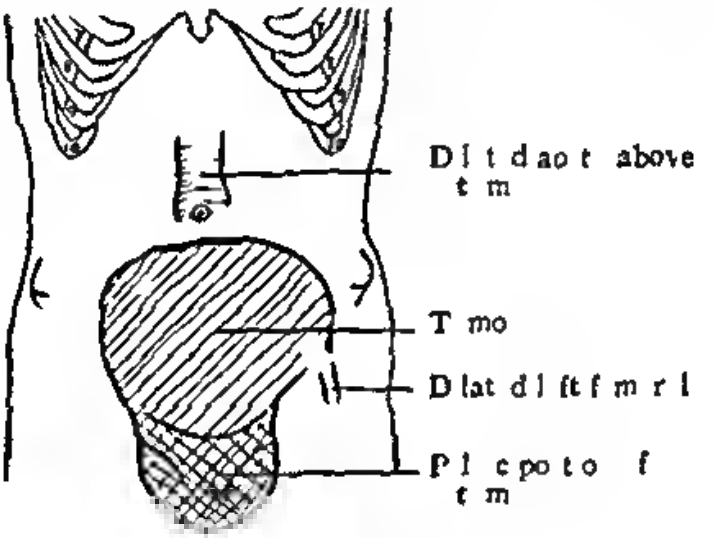


Fig 306 —Tumor as found at operation

A huge pulsating expansile mass so tense and beating so strongly as to make one recoil from palpation with surprise filled the lower abdomen It was better defined after I had put the patient to bed for a few days The notes made on November 19 1922 state The tumor is better palpable and softer It fills the lower abdomen to within 1½ inches of the navel It fills the whole pelvis and rises above the pubes in approximately the midline perhaps a little more to the left than to the right It can be felt per rectum almost immediately above the anus It beats with great force especially above the symphysis where it seems to lie especially close to the examining hand it also

was difficult A few days later his nurse noticed a black discoloration of the perineum which gradually spread until his hips and flanks were black and blue At the same time he again noticed a swelling in the left lower abdomen extending farther toward the midline than had the swelling of three years previous An *x* ray of the colon showed a low obstruction, diagnosed as probable carcinoma The surgical consultant said that the mass which he had felt at the former examination had increased in size and recommended laparotomy The patient did not accept operation and went back to his masseur The abdominal distention the feeling of pressure in the rectum and



F g 305 —Tum s palpat d b f e perat

bladder continuing he sought my advice The previous week both legs had begun to swell the swelling was greatest at the end of the day and disappeared after rest in bed The patient was inclined to attribute the onset of the last attack of abdominal pain and swelling of the legs to a troublesome cough that accompanied his first attack and had continued at intervals since He felt rather tired but less so than when being purged he suffered moderate dyspnea on exertion he was about 15 pounds underweight Urinary frequency had continued he got up about every two hours during the night He took two *x* ray treatments for his tumor but had a severe reaction after each of them

be described with the words that Valentine Mott used for Crane as a man of great composure' And further to quote Mott "He was now informed of the serious nature of his case and that without an operation very little chance of his life remained From the extent and situation of the tumor he was apprised of the uncertain nature of the operation as well as of the difficulty of performing it' I cannot add and indeed it would require an artery to be tied which never had been operated upon for aneurysm but the statement never had been successfully operated upon for an aneurysm of this kind and size would probably have been correct

I presented these facts to the patient gave him what statistics I could and stated that I could not urge an operation of such risk but should be willing to undertake it if he so wished He left the hospital to consider it

I must confess that the notion of operating upon this huge and inaccessible aneurysm caused me more trepidation and anxiety than were apparent in Mr D himself In ten days he returned and said that he was ready

On December 7 1922 I operated Dr Mary Botsford's skill in administering gas and oxygen anesthesia was an invaluable support

Operation —Under good gas and local anesthesia with ¼ plus ¼ gr morphin and after infiltrating the skin with novocain and adrenalin an incision was made in the left flank to expose the pulsating tumor which was thought to be an aneurysm of the left iliac artery The external oblique as well as the internal and transverse were split in the direction of their fibers and a triangular flap turned down after Kocher by incising the rectus sheath downward toward Poupart's ligament This did not expose the contents of the left iliac fossa as well as the incision used by Chevassu for carcinoma of the testicle The peritoneum pushed forward was adherent to the fossa by a good many strands and the ureter instead of going along with the peritoneum remained behind The left iliac artery exposed was seen to be normal the left vein not dilated The pulsating tumor pushed upward out of the belly with the hand was felt

to beat under the peritoneum and was not connected with the left iliac vessels The peritoneum was therefore opened and the tumor palpated with the hand It filled the whole pelvis and ran upward to the right flank far toward the right kidney Here there was felt a large artery which on being compressed with the thumb stopped the beating of the whole large tumor mass This incision was therefore closed the muscles being united in their proper layers with chromic gut Dr Botsford on being asked whether the patient would stand an opening of the right flank or whether she thought it safer to defer the operation for a week replied that she thought he would be better able to withstand a similar procedure on the other side now than he would a week later The man was therefore turned about on the left side and a similar but larger incision made following the right Poupart ligament an inch above it then upward toward the rib margin and again backward for 2 inches The muscles were again separated and the rectus sheath divided according to Kocher the lower fibers of the external oblique being later cut across so as to gain better exposure of the upper flank After pushing the peritoneum forward an immensely dilated blue iliac vein appeared the thickness of a large thumb and medial to it an enormous pulsating tumor whose outer surface was covered with many blood vessels running longitudinally The walls of this aneurysm were thin and soft and contained no chalky deposits With the forefinger the tumor was followed upward its pedicle lying under the small and rather hard right kidney whose capsule was opened letting out some of the perineal fat On compressing the arterial pedicle the pulse in the tumor again stopped Cautiously now the palm of the hand lying on the huge pulsating mass this pedicle was freed and little by little the index finger hooked completely around it working from the outer side toward the midline After it was surrounded by the finger the pedicle could be compressed between the forefinger and thumb but it lay so far upward and at such a depth that the whole hand up to the level of the wrist had disappeared in the wound After several trials a large aneurysm needle loaded with a double strand of stout gut was

passed around the afferent artery its tip being guarded by the tip of the left index finger With some difficulty the catgut projecting from the needle was wound around the finger tip and the needle withdrawn Into the noose two further loops of stout gut were laid and then drawn back around the artery One of them was stitched with a mattress suture into a large slice (about 4 inches long and 1 inch thick) which had been cut from the tendon and belly of the external oblique and this with much difficulty was drawn back around the artery by the stitch fastened to one end With the index finger this free muscle graft was partly pulled partly pushed through the space around the artery which the dissecting finger had prepared for it The stitch was then tied around the free end of the graft The sling thus formed was not tight enough to stop the pulse in the tumor It was therefore pulled upward by an assistant and a second ligature of stout gut passed around it This stopped the pulse in the aneurysm It was curious to note that while this constricting loop of muscle tissue was drawn upward partially occluding the pulse in the aneurysm a thrill was felt in the sac which had originally had a pulsation but no thrill The wound in the right flank was closed in layers as the left had been and the patient was put to bed awake His pulse after the occlusion of the left iliac artery if this it was that had been tied was slower than before The artery that fed the aneurysm lay unusually high for an iliac It seemed as though it might have been an artery coming off from the right renal if such an anomaly of the iliac origin occurs The artery was not normal at the site of ligature it was as large as a garden hose its lumen was perhaps an inch or more in diameter The operation lasted four hours and was dangerous and difficult

The postoperative diagnosis therefore was Saccular aneurysm of the *right* common iliac artery

In reviewing these notes after operation I do not see how I could have avoided my regrettable error in diagnosing the aneurysm as one of the left instead of the right iliac vessel an error which needlessly prolonged and complicated an operation at best so hazardous The absence of the pulse in the left foot

as well as the left sided development of the aneurysm which had felt as though it went directly over into the dilated left femoral artery had led me to believe that it originated from a left iliac vessel The left iliac artery was probably pressed by the large tumor against the bony wall of the pelvis and its lumen narrowed whereas the force of the blood stream in the smooth and open aneurysm of the right iliac was unchanged This compression of the left iliac was I fancy the reason that the pulse in the left leg and foot was weaker than in the right Nor do I know how it would have been feasible to ascertain had I been in doubt which I was not from which side the aneurysm sprang An attempt at manual compression of the iliacs through the belly wall with this thin tumor underneath would surely have been inadvisable Indeed the mass seemed so nearly ready to burst and the blood in it beat so strongly that I went at its palpation very gingerly and with fear that I might do harm One touch of the belly was enough to instill trepidation into any surgeon

The error in diagnosis determined my choice of approach to the tumor The incision in the left groin and flank was of course unnecessary Had I begun operation doubtful of the side from which the tumor came I should have made my approach across the belly in the midline either vertically or transversely with a Pfannenstiel incision which might subsequently have been carried outward to one side or the other

As it was I do not know whether a laparotomy once I had closed the left flank would have been better than the right retroperitoneal incision insufficient as the exposure was that I had from it The tumor rose so high that it would have covered an iliac pedicle from the front It would have been necessary in order to empty the sac to have put a temporary ligature around the aorta Whether the patient would have stood this additional strain and the postoperative distention following laparotomy as well is a question However it is certain that a long laparotomy incision would have allowed me more freedom and a better oversight

The pedicle of the aneurysm lay so high that I was sure

after operation that I had to deal with some anomaly of the iliac vessels Henle gives a list of such anomalies including instances of bifurcation of the aorta as high as the second lumbar vertebral body

The dilatation of the vessel leading to the aneurysm and the thin vessel wall forced me to adopt some method of occlusion other than that of ligature with silk or catgut As far up as I could possibly reach and farther the iliac artery was dilated to three or four times its normal caliber its wall which was fortunately elastic and free of chalky plaques was so thin that I was in great dread after having isolated it that it would tear apart under my fingers The operation therefore followed rather Anel s who tied the vessel close to the aneurysm than Hunter s who ligated at the site of election choosing for ligation a healthy vessel at a distance from the tumor I was afraid therefore that the dilated thin walled and unhealthy vessel would rapidly cut through if I tied it off with a thin ligature Owing to the depth of the wound and the impossibility of conducting the ligature under the guidance of the eye the vessel could not be freed sufficiently to wind around it in a spiral a strip of organic material say fascia after the manner of Halsted Choosing therefore for a living ligature a material which lay abundantly at hand which I was able to get in sufficient bulk and thickness to ensure against erosion and in sufficient length to enable me easily to encircle the artery with it and which I calculated would shrink rather than give in the days following operation I selected muscle for my graft I reckoned that transplanted muscle would rapidly become fibrous and shrink making an occlusion which might grow tighter in the first few days or weeks I encircled the vessel with the thick muscle ligature and then stitched its ends together with a mattress-suture so that they might not slip apart

It will be noted in the course of observation that the pulse in the aneurysm which had disappeared when I finally applied the last tie to the muscle ligature returned an hour later but that it gradually disappeared from the arteries of the right leg from the groin down and has remained absent The return of

the pulse in the aneurysm is probably due to blood flowing into it from the various subsidiary channels from the epigastric artery through its anastomoses with the mammary through the lumbar vessels through anastomoses with the hypogastric of the same and of the contralateral side The alarming thump of the aneurysmal pulse however has been checked permanently since the operation It may be objected that I am mistaken in my estimation of the force of the aneurysmal pulse before and after operation and that my desire to find it weaker has misled me The disappearance of the right femoral pulse from a little below the groin down and the disappearance of the popliteal and tibial pulse allow of no mistake Since occlusion of the main parent artery of the right leg the blood stream below it has not had sufficient force to raise the walls of the main arteries of this leg to a pulse beat

The absence of any thrill bruit or murmur in the large pulsating aneurysm is noteworthy it is still more noteworthy that the thrill should have appeared for an instant only while the occluding loop of muscle was being drawn up and tightened and that finally after it had been tightened the thrill should have disappeared again

We are still ignorant of the cause of vascular thrills and murmurs Both their presence and their absence have given rise to mistakes in the diagnosis of aneurysm and have been subjects of considerable conjecture The problem of vascular murmurs is so far from solution that Exner was led to remark One might enquire not so much why certain diseased arteries do give rise to a murmur as why every normal artery does not

Stich and Fomme [1] in their work on injuries of the blood vessels and their sequels (aneurysm) cite a dozen cases of thrills and murmurs leading to a diagnosis of aneurysm At operation no aneurysm was found but various more or less indefinite changes in the vessels such as constriction by scar tortuosity due to excessive shortening after fracture of the femur and questionable dilatation or lengthening of the artery The presence of a bruit caused these errors distressing and embarrassing at times but of no grave consequence The

opposite mistake—of failing to diagnose aneurysm because of the absence of a bruit or murmur—is more serious and has brought on avoidable fatalities

The aneurysmal bruit seems to be not uncommonly absent. Sir John Erichsen said 'that this especially happens in sacculated aneurysms with small mouths or in those that are much distended with coagula or blood and ' thus for instance it not infrequently happens that in an aneurysm of the ham or thigh no bruit or but a very faint one is audible so long as the patient is standing but if he lie down and elevate the limb so as to partly empty the sac then it may be distinctly heard

There was no murmur or thrill to be heard in Mr D s aneurysm either while he was standing or recumbent The thrill however appeared just as it did in Halsted s experiments at one particular degree of occlusion of the artery Now with all our ignorance of the cause of vascular murmurs we do know that certain factors are necessary for their appearance first a certain swiftness of the blood stream and second—probably—certain irregularities of the vessel wall It was not sluggishness of the current in the aneurysm that accounted for the absence of a bruit in our patient This is proved by the bruit s appearing when the artery was constricted *i e* the current made more sluggish rather than hastened I should be more inclined to ascribe its absence to the arteries being soft and smooth and free of plaques or atheroma And it may well be this same smoothness of the vessel wall which kept the blood in the huge sac liquid and free of clots that made entirely unlikely a spontaneous cure by coagulation

It is impossible to determine the cause of this aneurysm Nothing speaks for syphilis there is no history of venereal disease repeated Wassermann tests have been negative the changes in the arteries themselves were quite unlike syphilitic ones—there were no atheromatous plaques but a wide spread and generalized dilatation A number of authors among them Hawthorn have called attention to tuberculosis as a factor in aneurysm Hawthorn considers tubercular aneurysms to be due to four groups of causes (1) Miliary tuberculosis of the in

tima (?) tubercular polyps attached to the intima (3) tuber culosis of the arterial wall involving the several layers (4) aneurysms whose walls are composed of tubercular tissue *i e* invasion of the wall of an artery by a cold abscess or a caseating focus

Mr D s aneurysm did not fall into any of these groups as far as could be discovered His postoperative recovery rules out 1 and 2 Tuberculosis of the vessel wall is unlikely consider ing the huge size of the aneurysm We had no evidence at operation of a cold abscess or tubercular focus lying near or encroaching on the artery A sinus which formed in the left flank after operation however makes the cause of this fourth group a possibility to be considered The diffuse thinning of the vessel walls and the dilatation not only of the right iliac but of the left femoral and the aortic arch would make one inclined to seek the cause not in a disease localized at a par ticular spot in one artery but rather in a vascular weakness either congenital or produced by a protracted cause—and this might possibly lie in the pulmonary tuberculosis which he has carried for many years

Course —Four hours after operation the left posterior tibial artery pulsated but not the right (which before operation had had the better pulse) Both feet were cool but not livid

Eight hours after operation the left femoral pulse was good the right was very small The patient was weak and tired but said he felt hungry and had a good slow pulse Every fifteen to forty five minutes he cried out with a sharp spasm of pain across the lower belly He could move his feet and toes

The day after operation (December 8th) Tumor still pul sates At 9 30 to 10 P M after receiving an injection of mor phin there was a great increase in the pulse rate and a very weak pulse I saw him at 11 P M At this time the spasms of which he previously complained had become fewer and the patient who had been restless at first after the pulse went up was in an alarming collapse with cold hands and sweating pro-fusely He passed gas spontaneously and had very little belch ing I gave him strophanthin 1 mg in two doses of ½ mg each

with an hour between whereupon his pulse became a little fuller but remained rapid When the attack first came on the nurse said it was scarcely perceptible During the night he had injections of caffein and black coffee by mouth

December 9th Early this morning Dr Hewlett saw him and considered in view of the collapse coming on so late that it was more likely to have been produced by hemorrhage than by shock and advised transfusion I did a direct transfusion vein to vein from a Group IV donor The patient s pulse did not improve during the transfusion and the donor was not visibly affected thereby Considering the uncertainty of this method I asked Dr Kistler to do a transfusion with the Kimpton Brown tubes admitting 750 c c into the patient s vein Upon this although his pulse rate was not markedly diminished the volume was much better and the patient was visibly brighter At the onset of this attack he complained of an itching and burning of his legs the legs however were not gangrenous The hemorrhage if there was one probably came from some of the retroperitoneal veins The conjunctivæ were not sallow as in the absorption of a large clot

December 11th Patient can turn with ease Spasms of pain have stopped Leg warm

About December 18th an effusion appeared in the left knee This was tapped and the fluid sent to Dr Dickson who reported

The fluid was turbid and mucinous Smears showed very many pus-cells but only an occasional endothelial cell or lymphocyte No acid fast bacilli or other bacteria were seen in spite of repeated and prolonged search of several slides

Aerobic cultures on blood agar and in calcium carbonate broth and anaerobic cultures in enriched agar were prepared None of the cultures showed any growth in seventy two hours

Guinea pig No 1 (new series) was injected

(On January 8 1923 Dr Dickson reported that Guinea pig No 1 died within two weeks of the date of injection and showed no signs of tuberculosis or other infection No cause for death was determined)

From this time on Mr D s recovery was uneventful The temperature never rose above 99 5 F The cause of the sudden collapse coming on thirty hours after operation remains undetermined There was no subsequent evidence of a profuse internal hemorrhage The urine examined ten days later was free from urobilin

There was never any occasion to fear gangrene of the right leg or foot

December 20th Stitches removed Wounds healed Slight edema of both legs

December 26th Mild attack of thrombophlebitis in varicose veins of the right leg with slight fever (99 F) Mass in abdomen still pulsates not much smaller than before operation

January 8 1923 Pulse in right femoral decidedly smaller than on left left popliteal posterior tibial and dorsalis pedis pulsate well none of these arteries pulsates on the right side

January 9th Left hospital

February 6th After an automobile ride about a dram of pus appeared in the left scar Smear showed no bacteria

February 11th Tumor decidedly smaller Decrease especially noticeable per rectum

Since this the tumor has steadily decreased It is still palpable above the pubes to within 2 inches below the navel and may be felt per rectum at the very tip of the finger It is softer and the force of its pulsation is diminished

The right femoral can be felt to pulsate for about 1 inch below Poupart s ligament below this level there is no pulse in any of the arteries of the right leg The left femoral whose caliber it will be remembered is larger than normal can be felt half way down the thigh to Hunter s canal the left popliteal posterior tibial and dorsalis pedis arteries all pulsate

Both legs are still edematous they swell unless the patient keeps them wrapped He does not complain of cramps in the legs neither leg is cold they show no evidence of insufficient arterial blood supply

He has had no further trouble with bowels or bladder and has regained his original weight His cough is still troublesome

at times He is up eight to ten hours and attends his business office daily

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HEAD INJURIES INDICATIONS FOR SURGICAL TREATMENT

IN the main there is a fairly general agreement that depressed fractures should have the depression relieved, that perforating and penetrating wounds should be surgically cleaned at the earliest opportunity There is not the same divergence of opinion regarding the surgical handling of these cases nor the difficulty in decisions that there is in another larger group

It is the case that is brought in without a skull depression or a penetrating wound and is in a serious condition from a head injury that taxes our judgment and makes decision difficult In such cases there is usually a fissured fracture or fractures of the vault or base The evidence of the former is found in the hemorrhage beneath the scalp along the area of bleeding, recognizable by the pitting on pressure over this area The associated tenderness along the line of fracture assists us in the conscious patient Roentgenograms of each side of the skull and the front and back add to our clinical information Diploic and arterial vessel markings of the skull can ordinarily be differentiated from the fracture lines

With the fractures of the base the bleeding from the ears the later ecchymoses over mastoid and the horseshoe ecchymoses from it around the auditory meatus attract attention to the fissures of the petrous bone The bleeding from the nose or vomiting of swallowed blood the ecchymoses subpalpebral and subconjunctival in the absence of direct injury to the soft tissues are important findings and assist us in forming a judg-

ment of the bone injury to sphenoid ethmoid and orbital plates Additional information may come from the character of other discharges from these orifices from other ecchymoses emphysema etc The roentgenograms help us less

Such examinations and findings give information as to the severity of the trauma Such bone injury however bears little relation to the intracranial injury The most severe brain injuries are often seen and later found to not be associated with any bone injury A policemen s club may cause by a sharp blow a fracture without generalized brain contusion where a thud of a sand bag may widely disorganize the brain and yet produce no bone injury Compression of a skull between a ship s side and the pier may compress and fissure the skull widely and yet produce no brain injury The type of trauma more often than the degree of bone injury is indicative of the brain damage On the other hand the bone injuries particularly of the base which may open avenues of infection to the meninges are factors affecting our prognosis

Fissured fractures *per se* require no operative treatment What intracranial conditions can be helped surgically? Wide spread brain contusions lacerations and free hemorrhages are rapidly fatal These are present in the patients who after severe head injuries remain unconscious with a low blood pressure rapid pulse and from a subnormal temperature climb rapidly to a high one with a fatal ending

In an injury so severe that the patient shows no signs of reacting to it surgical efforts can offer little Exposure of the brain in such a case may show an intracranial pressure below normal the brain plum colored disorganized or lacerated free blood in the cranium and venous congestion Far from there being increased intracranial pressure the dura may be lax and opening of it shows an actual space between the dura and the low tension brain

In such the fatal outcome is due to the patient s shock if we may use the term to his low blood pressure and the pulped brain With a lesser degree of shock and with evidence of the patient beginning to react then perhaps with

injury with a pulse which had progressively slowed to 48 or thereabouts with increasing pulse pressure approaching the same figure and with rapidly deepening stupor some measure to relieve this pressure would be urgent

If on the other hand with the same pulse rate the pulse pressure was lowering the stupor lessening and the patient improving one would at least feel much less apprehensive and feel justified in awaiting further change

In brief in the borderline cases the determining factor is the way the signs are progressing rather than the signs themselves

In the more advanced pressure cases we feel that an immediate attempt at relief should be made

When the patient has run the gamut of increasing intracranial pressure signs and can no longer compensate for it through vasoregulation the terminal state of automatic action of those centers with a climbing pulse rate lowering blood pressure and irregular respiration indicates the approaching end and surgical efforts are of little avail

Nothing of the purely neurologic aspect of these cases has been mentioned It seems to us that primarily one needs to think in terms of physiology rather than neurology For the surgeon the gross neurologic findings such as a hemiplegia present or increasing should be readily recognized and would affect his judgment While the value of a thorough neurologic examination is not to be minimized the neurologic details are of less practical import than the physiologic responses to pressure A hemiparesis or hemiplegia with slight or marked evidence of acute cerebral compression would of course direct one's attention to the portion of the brain affected and in operation direct the approach

Consideration of the selection of the comparatively small *percentage of cases in which the indications for surgical relief* seem beyond question bring up the pathologic conditions which we can relieve

For practical purposes it is convenient to divide the pathologic conditions into

(1) Brain injury with its contusions of varying degrees and locations etc

(2) Fluid accumulations within the skull

These two conditions are of course frequently associated, but usually one outranks the other in the production of danger ous effects

The first condition is a destructive one and while we may offer some help surgically our efforts are more often ineffec tive

The second—fluid accumulations—gives us our greatest opportunity to afford relief

As to the brain injuries while varying greatly in degree and location, it is noteworthy that the greatest injuries are often near the region of the injury and at the opposite pole of the brain and also irrespective of the site of injury to the head the tips of the temporal lobes and the under surface of the frontal lobes seem to be the places most subjective to contusion and laceration Following brain contusion swelling occurs as in other bruised parts The work of Cannon seems conclusive that tissues contused and deprived of oxygen take up fluid In this tissue edema it is to be kept in mind that the fluid is more or less fixed in the tissues It is not free fluid

The swelling of the brain The brain edema will be greater or less depending upon the factors producing it If this swelling is moderate in degree it may be compatible with life If great the compression induced in the cranial chambers may be in compatible with the proper cerebral circulation cause extreme intracranial pressure and death

With such swollen and bruised tissue the relief of intra cranial pressure by any decompressive operation to allow room for expansion is not very satisfactory While some additional space may be given for expansion one is impressed with the ineffectiveness and inadequacy of the operation To give relief from pressure in true traumatic brain swelling the factors caus ing it must be removed This is not usually within our power It is possible that in a rare instance perhaps one might happen upon a badly contused and pulped temporal lobe The washing

out of clots and devitalized tissue would seem a proper procedure and be helpful Such cases would be rare

It seems a fair statement that to be of help in relieving intracranial pressure after head injury something must be removed from the intracranial cavity namely some fluid accumulation

Of the fluid accumulations within the skull it seems hardly necessary to mention extradural hemorrhages The classical picture of primary unconsciousness followed by consciousness and then deepening stupor perhaps with hemiplegia has been often quoted but the extradural hemorrhages unfortunately are not always aware of the rule and are not so obliging as to be invariably typical However the signs of an intracranial pressure increasing with often a hemiparesis and perhaps clinical or x ray evidence of fracture in the temporal fossa give us a clue Extradural hemorrhages too are not infrequently elsewhere than in the region of the middle meningeal artery or near its bifurcation The aim of treatment of such a condition is obvious—to evacuate the clots and stop further hemorrhage With free bleeding inside the dura however one is not usually so fortunate as to find the bleeding point but evacuation of any free blood and drainage for a limited time can be practised

As to the other fluid accumulations much has been written of arachnitis or serous arachnitis implying a formation of fluid due to an inflammation of the arachnoid and this name has been used to cover certain accumulations of intracranial fluid We have not seen or at least have not recognized this condition There is no reason why inflammation should not follow injury in the course of wound repair it is to be expected and certainly leptomeningitis in various forms and from various agents is common enough

There is however a condition which to our knowledge has not appeared in the surgical writing on head injury nor been mentioned by surgical observers namely collections of fluid between the dura and the arachnoid

It must have occurred to all who have operated upon any considerable number of persons with head injuries that an operation

has been conducted in the presence of signs of marked pressure In a certain group the dura is found tense and obviously the intradural tension is increased

When the dura is nicked there is a spurt of fluid oftentimes to a considerable height and it escapes in great amount This fluid is often water clear but at times may be blood tinged With this escape the intradural pressure lessens rapidly

When the dura is opened widely and a brain spoon inserted between it and the arachnoid it is found that there is still more free fluid in this space This may be present in all directions from the subtemporal decompression opening—over the parietal frontal and occipital lobes as well as over the temporal Following its evacuation it will be noted that there is also much subarachnoid fluid and that the arachnoid spaces sweat unusually freely In an uncomplicated case the brain will show no visible evidence of contusion It will be entirely normal in appearance The free fluid evacuated has been collected and shows the usual chemical and microscopic findings of normal cerebrospinal fluid Drainage of this free fluid rapidly lessens the intracranial pressure

The important point in this group is that this free fluid which is apparently normal cerebrospinal fluid is *in an abnormal location* Normally there is no fluid between the dura and the arachnoid In the circulation of the fluid from the ventricles it passes through the foramina of Magendie and Luschka in the pial roof of the fourth ventricle and from there on it remains beneath the arachnoid between it and the pia and circulates through the basal cisterns and on

From these larger cisterns it circulates over the various surfaces of the brain and to the final points of absorption In these cases of head injury on the other hand we find this fluid increased in the subarachnoid spaces as shown by the free sweating of the cortex but in addition we find these enormous collections of subdural fluid often to the amount of 2 or 3 ounces

The reason for the appearance of this fluid in such a place is not clear It seems likely of course that it is due to ruptures in the delicate arachnoid which permit its escape We have found

out of clots and devitalized tissue would seem a proper procedure and be helpful Such cases would be rare

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It must have occurred to all who have operated upon any con siderable number of persons with head injuries that an operation

In the decompression for brain tumor a large opening is desirable In decompression for the cases under discussion the operation is one for drainage and a large bone opening is unnecessary The cases we can help materially are those in whom something can be removed namely fluid whether it be blood or the subdural collections mentioned Removal of these fluids at operation with drainage for forty eight hours is the rule

The bone opening need only be so large as to permit satisfactory exploration in all directions The operation of Cushing for subtemporal decompression is particularly adapted to these cases and may even be said to have its greatest usefulness in traumatic cases In cases with a general increase in intracranial pressure a right sided operation is performed In cases with general pressure and some localizing signs such as a hemiparesis or hemiplegia it is performed on the side of the brain involved In occasional instances bilateral decompression is used In this operation the temporal muscle and fascia covers the site of the craniotomy These structures not only afford protection and restraint to brain which may tend to herniate but also present a free yet protective barrier for the drainage channel The raw surface of muscle which comes to lie against the exposed brain presents for a few days an area of great absorptive power—a factor in taking up excess fluid The muscle and fascia give adequate protection to the area under the bone defect No noticeable deformity remains The site of operation also is such that the points of probable extradural hemorrhage are encountered The middle meningeal artery and its branches can be controlled The temporal lobe so frequently the site of greatest damage is exposed From this opening too exploration can be conducted upward with proper instruments toward the motor cortex and toward the poles of the brain

Some comment should be made as to other methods of removing fluid from the cranial cavity for the relief of pressure Spinal puncture is of value in demonstrating free bleeding into the subarachnoid spaces It is of value in tiding over and symptomatically relieving certain borderline cases It is of course valueless in case of extradural bleeding

In the subdural (extra arachnoid) collections of fluid men tioned spinal puncture will symptomatically relieve This procedure however withdraws subarachnoid fluid rather than the fluid which is extra arachnoid and rapid return of pressure and reaccumulation of fluid is shown by large amounts of fluid on the next puncture In such an instance drainage by operation is indicated It is our feeling that in the face of rapidly ad vancing signs of pressure spinal puncture is inadequate

The use of hypertonic solutions which have been shown by Weed Wegefarth and their associates to decrease brain volume and lessen intracranial pressure under certain conditions has been tried In the comparatively few instances in which we have used it in traumatic cases it has been of no demonstrable benefit It deserves however further trial since it unquestionably has a marked though temporary affect in certain of the chronic brain compressions

It is our feeling that decompression and drainage is of great value in properly selected cases Their number is not great Drainage is the important factor The group characterized by collections of great quantities of fluid immediately beneath the dura and by a damming back of subarachnoid fluid as shown by the great sweating of these spaces when pressure is relieved from without is one to be compared with extradural hemorrhage in the satisfactory way in which it responds to treatment

CLINIC OF DR WALTER I BALDWIN

UNIVERSITY OF CALIFORNIA MEDICAL SCHOOL, DEPARTMENT OF ORTHOPEDIC SURGERY

TECHNIC OF KNEE EXCISION AND BONE SUTURE

THE time required to secure bony union after operations for knee excision in joint disease or extensive injury has often impressed us as being perhaps unnecessarily long

Furthermore we have noted that a certain proportion of these operations do not result in bony union a short fibrous union resulting instead These are the cases which result in late flexion deformity—fortunately not common Fibrous unions however do not give the strong walking legs which know no fatigue

These facts led us to suspect that there might be some fault in the method Briefly this consisted of sawing off the surfaces of the tibia and femur to be rid of joint cartilage and then suturing the joint capsule occasionally supplementing it with a deep bone suture of kangaroo tendon or silver wire Subsequent x rays taken in two planes often revealed the fact that there was shearing of the cut bone surfaces away from accurate contact in one plane or the other This loss of accurate contact occurred at some time intervening between the wound closure and the application of the splint—usually during the hardening of the plaster cast In fact this often occurred even when the greatest care was taken to prevent any movement between the tibia and femur The area of contact between these bones would be small instead of over the whole cut surfaces In general we found that these cases were delayed in time of union and were more liable to result in merely fibrous ankylosis

This latter condition seemed to us traceable to blood collecting between the unopposed bony surfaces with subsequent

organization of the clot and ingrowth of fibrous tissue cells from the outside thus forming a barrier through which osteoblasts could not make their way

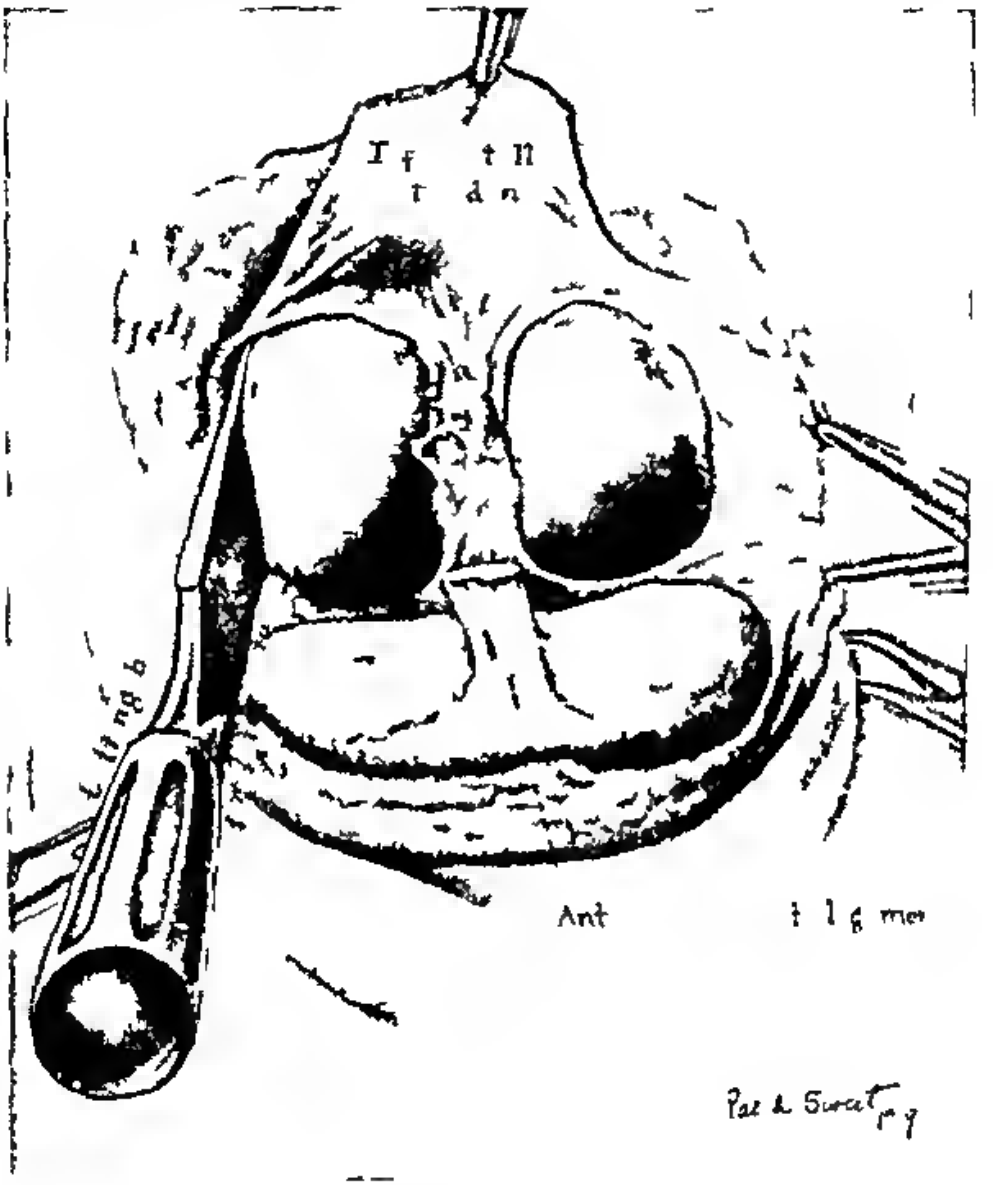


Fig 307—Cutting bone and periosteal flap from medial surface of internal condyle of femur and adjacent bone

We assumed also that sawing of the bone surfaces might leave bone dust behind fill the bone spaces and impede the establishment of circulation across the defect For this reason we used a broad flat osteotome to remove the joint surfaces instead of a saw

The method of internal fixation seemed by all means the most important question In view of the fact in our bone grafting experience periosteal callus was thrown out more readily than that from the cortical or endosteal areas it seemed most important to secure accurate apposition by osteoperiosteal flaps from the tibia and the femur The fact that they can be easily secured on the anterior and lateral aspects of both bones further recom

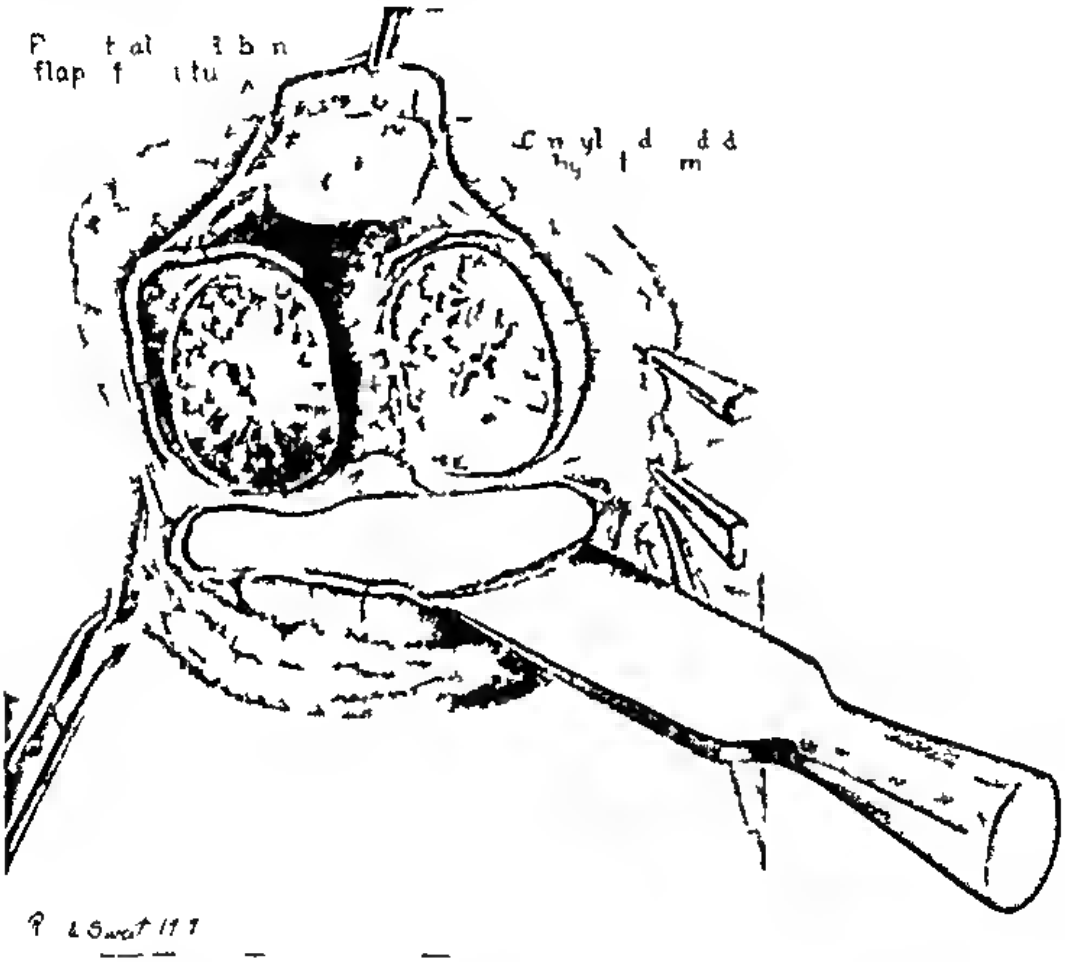
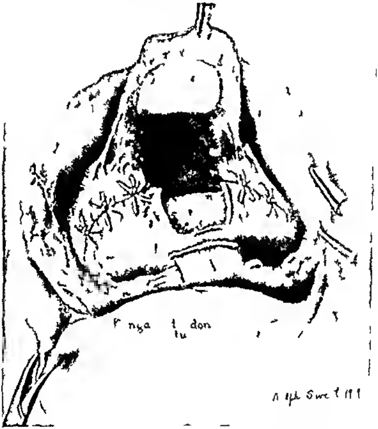


Fig 308 —Removal of articular surfaces with osteome instead of saw

mended them The suture of these flaps seemed mechanically easier and more exact than the placement of deep sutures and afforded far better fixation Furthermore their suture presented a barrier to ingrowth of fibroblastic cells from at least the anterior and two lateral aspects of the knee Splendid experimental work of Cowan of Stanford University Medical School on fractures of the patella bears out these clinical observations

We found that the suture of these thin osteoperiosteal flaps (with the patella countersunk) gave a surprisingly good fixation of the bones so that a long plaster of Paris spica could be applied without fear of displacement of the more or less accurately apposed bone ends



F g 309—S t of bo compl t d w th patell dy to be pl ced c t b of m ral l hn 25 d gre f fle

It is our impression that the time of union has been reduced but this statement should not be made until statistics of accurate observations are submitted

It should be recorded however that the method allowed suc

cessful excision with later bony union in a child of eight years where but one femoral condyle remained after the other had been removed for disease by a surgeon elsewhere

We follow Brackett's advice of fixation in the flexed position, feeling that it gives far better function than in the extended position

Figures 307–309 illustrate the operation in its various stages

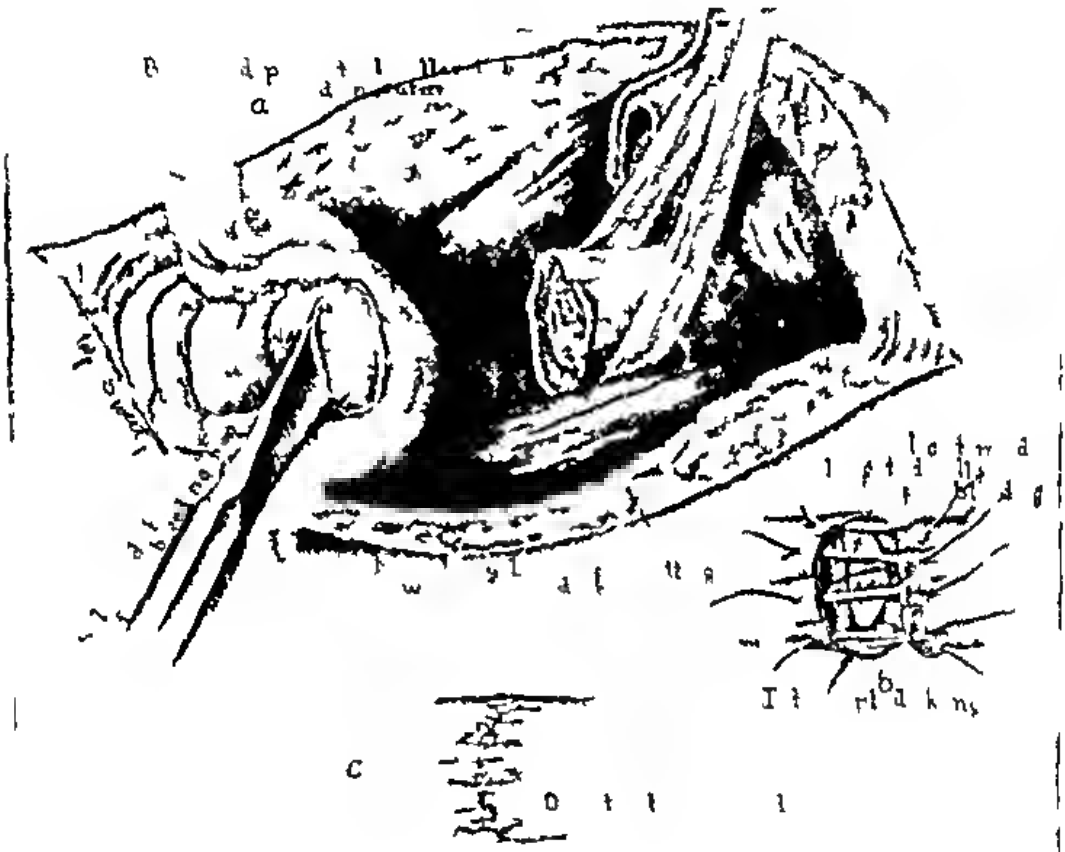


Fig 310.—Direct suture of non union of humer

Direct Bone Suture.—Through war experience with non union in single bones particularly the humerus we have come to strongly advocate direct bone suture by the osteoperiosteal collar method The direct suture method offers far better hope of success than can the more precarious method of bone graft Important also is the fact that it greatly shortens the period of disability

The method is illustrated in Fig 310

The operation is followed immediately by the application of a plaster of Paris shoulder spica to the hand and around the body The cast is continued until such time as union is firm no other splint being permitted

CLINIC OF DR FRANK HINMAN

UNIVERSITY OF CALIFORNIA HOSPITAL

THE STANDARDIZATION OF PROSTATECTOMY WITH REFERENCE TO THE RECENT MODIFICATIONS OF YOUNG S TECHNIC

THE history of prostatectomy presents many controversies not all of which are settled Probably no surgical field can show such prolonged active dissension over technical methods for the treatment of the same condition The differences under dispute would seem to cover only insignificant and minor details but the immediate and distant effects of these details have been held and usually proved to be of vital significance

Two standard methods of surgical attack have survived—the suprapubic and the perineal Each has passed through its own period of development but neither can be pronounced as perfect The Fuller Freyer technic stands out with slight modifications in different hands as the standard method of the one route and Young s technic modified as to some details also as of the other

The overwhelming popularity of the one over the other is due to the growing conviction that subrapubic removal is technically easier and that the functional result therefore is more certain to be satisfactory because of the more certain absence of any surgical defect The technical difficulties of perineal removal account for its general disfavor although for a number of years it had considerable vogue in America due no doubt to the unusual success of Dr Young with it The perineal route is even now universally recognized as the more benign of the two methods and when performed successfully and correctly so as

to give as good or better functional result it is undoubtedly the method of choice for this one reason

The technical difficulties of perineal prostatectomy consist primarily in keeping out of the rectum in preserving the external sphincter from injury as a direct effect of surgery or an indirect one of adhesions or scar and in protecting the ejaculatory ducts from destruction and occlusion and secondarily in securing a clean complete removal of the obstructing prostate in such a manner as to prevent a recurrence and at the same time to leave no structural defect These difficulties are all not strictly confined to the perineal route The rectum and the external sphincter are peculiarly partisan but suprapubists injure the ejaculatory duct incompletely remove the obstruction and sometimes leave pronounced structural defects besides other difficulties peculiar to the suprapubic route But undoubtedly rectal fistulæ and incontinence as surgical sequelæ of perineal operations account for the almost universal adoption throughout the world of the suprapubic method of prostatectomy Surgeons inexperienced in perineal prostatectomy prefer subjecting their patient to the somewhat greater surgical risk of suprapubic removal in order to lower the risk of functional failure later However the late results even after suprapubic removal are not altogether and always satisfactory Personally I have seen more complete functional failures secondary to suprapubic than to perineal removal You might infer that my own failures inasmuch as I prefer the perineal route have gone elsewhere for correction but careful complete follow up records disproves this explanation The point I wish to make is that suprapubists are not justified to regard their results so superior and certainly in no way perfect or completely satisfactory Even suprapubic prostatectomy requires better standardization and considerable technical improvement

Proof of the thoroughness of Young s technic is found in the fact that it has stood almost twenty years without modification and the future alone can answer whether the slight changes recently advocated both by Dr Young and several of his pupils will improve the results over those of the standard method In

December 1921 were published in detail personal results with perineal and suprapubic prostatectomy [1] and at the same time there was presented a slight modification in perineal technic used in the last 25 cases of the report of a radical *en masse* enucleation Analysis of my own mistakes on all perineal cases up to this time showed that the most costly had been the complications arising from urinary infection and the defects in structure that had resulted from an incomplete enucleation of the gland at the time of the operation I had gotten into the rectum only once in 90 operations and the opening had closed spontaneously before the patient left the hospital so that I did not regard the danger of rectal injury as a serious difficulty There was one case of partial incontinence a case however which had had an incomplete suprapubic operation previously Only 7 including the case of partial incontinence of these 88 initial perineal operations (2 surgical deaths) failed to get complete relief and satisfaction Up to the time of this analysis 81 consecutive cases had weathered perineal operation without a death and there was a total surgical mortality for all cases of only 2 2 per cent

It will not be possible in any large general series to expect by whatever method a 100 per cent complete cure Certain cases present clinical or urologic complications which prostatectomy may neither benefit nor cure These tentative failures can usually be recognized beforehand and should be so that they may have proper care subsequently The above analysis however served to emphasize two difficulties which presented themselves to me personally in the successful performance of perineal prostatectomy One was the clean complete enucleation of the hyperplasia and the other was perfect preservation from injury of the external sphincter The standard technic of Young has been slightly modified during the last few years with the idea that in so doing these two difficulties might be more

[1] Suprapubic versus Perineal Prostatectomy A Comparative Study of 90 Perineal and 38 Suprapubic Cases Jour of Urol 1921 vi 417

Structural Results of Prostatectomy with Reference to Methods of Enucleation Archives of Surgery 1922 iv 154

easily surmounted Radical *en masse* enucleation has been practised in order to secure completenes and in the last 21 ca es omission of the standard step of exposing and incising the membranous urethra in order better to protect the external sphincter

It would be wrong to leave the inference that these modi fications are altogether original For some time Chute[1] has practised perineal enucleation transprostatically and without opening the membranous urethra with the view of better pres erv ation of the external sphincter and Geraghty has clearly presented the anatomic and functional advantages of such a modification of Young s original technic Cecil[2] and Crowell have each presented modifications and special instrument of application *the former s being particularly commendable to those fearful of tearing into the rectum* and even Dr Young[3] recently advocates certain changes whereby *en masse* enuclea tions will ecure better structural results All these modifica tions have seen the light of publication practically simultane ously (betv een December 1921 and November 1922) and although the changes in technic have been worked out more or less independently they have this in common that the attempt to make perineal prostatectomy functionally more secure and technically easier is obvious

It will now be necessary for each one using a modified technic to keep accurate records of results in order again to standardize the method for slight differences in detail may be responsible

D sc ss n J U l 1921 v p 482 I hav been n the hab t of m k ng se of m thod that I th nk dim n h s the po s b l ty f mpa red control follow ng the per eal operat n th s t open th u thra by go ng th o gh th t p of th p ost t ts lf rather th a t r to t

[1] A N w M thod of P r neal Pr tat ct my h ch Insu es Mo e P fect Functional Results J u of U ol 1922 vi p 339

[2] A N w T hn c f Ie f m g Perin al P o t t ctomy J r Ame M d A soc 1922 l x 1061

[3] C well nd Th mpson Sa ral Anesth a n P r eal P tatect my A Mod fication f Yo g Ope at o w th S mm ry f Cases Jou Urol 1922 vi 81

Th Techn c f Pr statect my nd ts R lat n to Mort l ty Jour Am r Med A soc 1922 lxxi 933

for marked differences in results Dr Young for example objects to the inverted V capsular technic of enucleation which has the advantage of a wider and better visual exposure with a cleaner more surgical result because he has found that wound

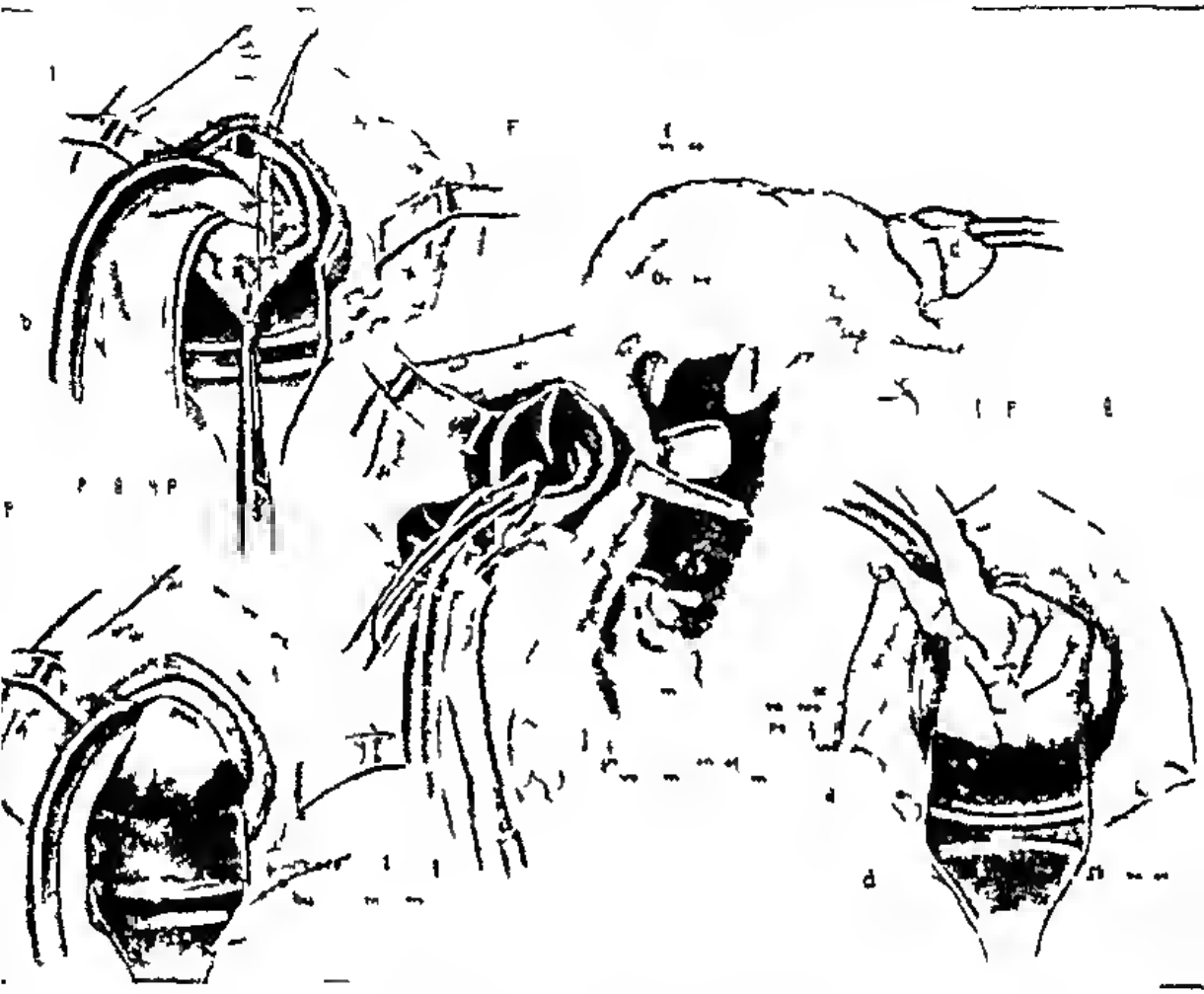


Fig 311 —Method of catheter drainage and packing *a* Urethral retention catheter is placed for vesical drainage and re establishment of prostatic urethra Perineal catheter is placed for drainage only *b* Light prostatic gauze pack in the prostatic bed for hemostasis Removed in twenty four hours *c* Closure of the prostatic flap by a mattress suture on the left with gauze and perineal catheter issuing through right sided slit *d* Placement of a large or small infraprostatic gauze pack which is removed one half hour after the prostatic gauze is removed provided there is no hemorrhage

healing was slower and occasionally a stricture formed at the anterior part of the prostatic urethra results explainable by the triangular flap having been so turned backward as to leave a larger area to be filled in by granulation By careful suture of

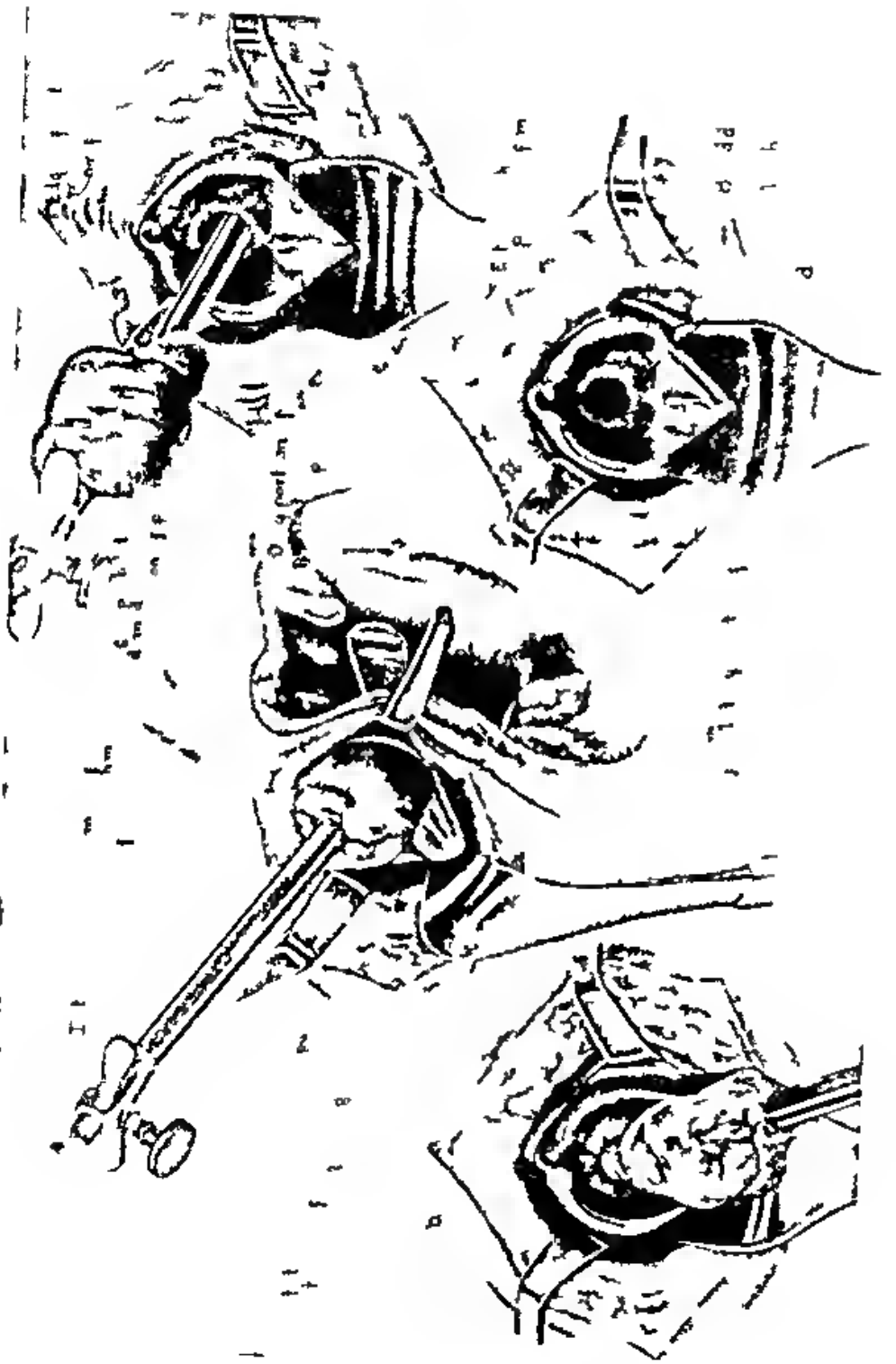


Fig 312

the flap back in position on one side and the use of a retention catheter so as to enable re establishment of a prostatic urethra just as is done after external urethrotomy we have on the contrary materially shortened healing and closure of the perineum in fact 14 cases or 21 per cent never leaked through the perineum after withdrawal of the perineal tube but we have had one stricture in a case in which a retention catheter was not successfully used The slight difference in technic of use or not of a retention catheter after operation may therefore be responsible for a marked difference in the time and character of healing (*vide post*)

The slight variation in Young's technic that has been more or less uniformly used in the last 61 cases is as follows

1 Young's seminal vesical tractor unopened has been used to replace the urethral sound as a guide to the apex of the prostate (in the last 21 cases)

2 When the apex is exposed the tractor is passed on into the bladder and opened for use in holding the prostate well up in the perineum thus facilitating the exposure of its posterior surface by stripping back of the rectum This obviates the need of opening the membranous urethra for the insertion of the prostatic tractor

3 A wide curved incision is made in the posterior surface of the prostate and is deepened sufficiently to open thoroughly the prostatic urethra The vera montanum and ejaculatory ducts are contained and preserved in this triangular flap

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Fig 312.—Method of enucleation *a* The hyperplastic mass has been freed in its prostatic bed except for its mucosal attachment at the vesical end *b* The urethral mucosa put on a stretch at the vesical margin preparatory to its division with knife or scissors *c* Ring type hyperplastic mass slid out on tractor shaft after division of the mucosa as shown in *b* The greater portion of the prostatic urethra has been removed with it The ragged edges are seen at vesical margin Internal sphincter has been surgically preserved *d* The structural result of perineal *en masse* enucleation Prostatic urethra dilated Internal and external sphincters preserved Ejaculatory ducts and verumontanum preserved Healing is possible with almost or complete obliteration of the prostatic cavity and for this healing the methods of drainage and of packing for hemastasis are important

Case N	Cl cal risk	U l g k	R t cath t for—	Dry w th cath t f r—	P m p tm ty f sed	Tim f cl sur m ca h l f	Tim in hosp tal f pe	Tim f prepa rat	T tal y in hos t l	R m ks.
1	A	C	10	8	8		19			
2	C	B								
3	B	A	11	3	3		15			
4	A	A	12	6	16	4	22			
5	B	B	16	12	12		48			Ep d dym t
6	B	A	17	14	14		8			Ca b l
7			14	10	10		24			
8	A	B	14	3	3		21			p p b cyst my f t p t p my
9	A	A	11	3	23	12	32			
10	B	A	N S	N	16		19			
11	B	A	17	14	14					Ep d dy mt
12	B	A	N S	15	15		25			O m dia
13	C	A	14		26	12	31	40	71	N ph wi h B P 215
14	A	A	24	16	6		60	N S		Recto-ur h al fi l losed pe eous y bef l hosp t l
15	B	A	16	10	10		23	8	33	Post pe t d m
16	A	A	20	20	25	5	43	8	51	Chill d p l t t y fif h d y
17	A	A	5		30	25	56	9	65	Ep d d m t f h ee h d Lef popl eal phl b
18	C	B	N S	N S		N S	45	79	124	P p t ry t my f ty d ys E d dymit Se phri d pyuria
19	A	A	14	2	2		8	4	2	H m rrh g pe th f m val f ca h
20	B	B	6		15	9	29	24	53	Phl b
21	A	A	5	2	2		20	6	26	
22	A	A	26	5	5		39	14	53	Phl b tis

24	A	A	12	5	5		20	12	32	
25	A	A	15	15	15		20	13	33	
26	A	A	14	12	12		23	10	33	
27	B	A	12	12	12		16	7	23	
28	A	B	9	9	13	4	20	16	36	P p t p d dym t
29	B	A	10	3	20	10	20	6	26	
30	C	B	14	10	10		0	4	44	
31	A	A	6	6	24	18	35	7	42	Sl ght p d dymut po t pe t A m bl d g f tw l d y
32	B	A	13	12	14	2	21	17	38	
33	A	A	11		20	9	21	6	27	
34	B	A	8		17	9	37	14	51	Hyp t d lb m
35	A	A	8	5	5		19	9	28	
36	B	B	13	Oc l k g	18	5	27	13	40	
37	C	C	6		17		26	29	55	C th t pl d f t th d y l k g f ll g d m l
38	C	C	7		14	7	15	56	71	
39	B	B	9	9	13	4	23	9	32	P t pe t d m t
40	A	A	11	11	20	9	28	6	34	Ep d dym t
N f es	39 Poo 6 Med m 14 Good 19 T t l 39	39 Poo 3 M d m 9 Good 27 T t l 39	38	19	38	18	39			
A g			9 d y	9 l y	14 l y l est 30 l y h t t 2 d y p l fist la	9 l y	27 l			
l t g				51		49				

Group II

Case N	Cl cal k	U l k	R ca h f —	D y h h f —	T m f l f m l f ca h t	P m perm ly losed	T m hosp tal p pe	T m f p pa t	T t l y hos p t l	R m k
1	A	A	5		10	15	27	9	36	H m h h d y po t pe
2	A	A	10		6	16	22	10	32	
3	A	A	13	10		10	21	12	33	
4	A	A	6		8	14	18	6	24	
5	B	A	7		8	15	14	17	31	
6	B	A	13		R pl d se l m		75	23	98	Rec o- h l fi t l P pe d m
7	A	A	8	3	6	14	22	8	30	
8	A	A	10	9		9	19	13	32	
9	A	A	7		16	23	28	10	38	Fp dym h h d y
10	B	B	15	13		13	19	26	45	
11	C	B	4			L f hos tal wi h pe l fi t l	44	27	71	D b p d d m tl
12	A	A	12		9	21	35	10	45	
13	C	B	4	2		2	18	9	27	
14	A	A	11	9			66	7	73	Recto- h l fi t l
15	B	A	10	7		7	16	18	34	Ep d d m tl p pe
16	C	B	14		2	16	60		60	D b t

17	A	A	17	3		3	20	N S	20	
18	C	B	8		26	34	I h p t l tp se t 101	26	127	P t p t t b h p m Acut h l cy t t fifty-eighth d y P t l b t y f th d y
19	B	A	8		12	20	57	9	63	
20	B	A	5		11	16	44	11	55	Epd dym tis p pe t D m t
21	B	A	14	2		2	21	14	35	
N f es		P 21 M d m 5 Good 16 21	21	9	11	18				
A g			9 5 d y	6 d y	10 d y	14 d y	32 d y			
P ce t g				43	57					

Poo
M d m 4
Good 7
10
21

P 0
M d m 5
Good 16
21

comparison to be a decided improvement and stands as a recommendation for postoperative catheter drainage and as evidence that the wide inverted V incision for enucleation does not delay perineal closure

Analysis of results as to functional restoration by the modified technic in Group II will not now be given as the period since operation is insufficient Our impression is that they are satisfactory An analysis already made of Group I is highly so[1] A glance at the table however shows two recto urethral fistulæ (Cases 6 and 14) We have found anatomic dissection somewhat more difficult than when Young s standard method is used Greater familiarity will probably correct this Young had 7 in his first 145 cases which he attributed to failure of approximation of the levator ani It is possible that the infraprostatic pack has been a factor in the rectal injury of these 2 cases

CLINIC OF DR HANS BARKAN

STANFORD UNIVERSITY HOSPITAL

EYE CLINIC DEMONSTRATION OF FOUR CASES

THE first patient I am presenting is a young man with double sided keratoconus These congenital anomalies are rather rare The patients may show other congenital anomalies such as microcornea retinitis pigmentosa and atrophy of the optic nerve As a rule the disturbance in the vision progresses slowly at about the age of puberty and as a rule equally so on both eyes The astigmatism caused by this conical projection of the cornea can at first be corrected with glasses but usually the projection advances to such a degree that an operative interference the aim of which is to produce a flatter cornea is called for The first recognition of this condition may be made by observing the reflex on the cornea of a placido s disk the rings of which will appear distorted The advance of the keratoconus may be rapid As a rule however it reaches its maximum point four to five years after the disturbed vision first noticed by the patient has brought him to us for diagnosis (Fig 313) When one looks carefully at this patient and in similar cases that I have seen it is to be observed that he shows a rather delicate physical build is nervous, pale complexion dry skin states that he seldom perspires freely and that his hair is apt to fall out readily The blood picture shows a relative increase in the lymphocytes and a marked increase in eosinophil cells In these days of interest in internal secretions it has been natural to place these patients in some relation to internal secretory disturbance and on the part of some authorities the whole picture of keratoconus has been put in the group of hypothyroid disturbance From the standpoint of treatment this is immaterial and we

comparison to be a decided improvement and stands as a recommendation for postoperative catheter drainage and as evidence that the wide inverted V incision for enucleation does not delay perineal closure

Analysis of results as to functional restoration by the modified technic in Group II will not now be given as the period since operation is insufficient Our impression is that they are satisfactory An analysis already made of Group I is highly so [1] A glance at the table however shows two recto-urethral fistulæ (Cases 6 and 14) We have found anatomic dissection somewhat more difficult than when Young s standard method is used Greater familiarity will probably correct this Young had 7 in his first 145 cases which he attributed to failure of approximation of the levator ani It is possible that the infraprostatic pack has been a factor in the rectal injury of these 2 cases

or loosening it somewhat The same procedure will be done on the other eye tomorrow I never operate upon both eyes at one sitting no matter what eye condition may be involved It is not good surgery for a possible infection may lose both eyes instead of risking one only The patient will keep to his bed for several days and will keep the pressure bandage on for two to three weeks and move about as little as feasible At the end of this time the cornea will be fairly flat and marked with a gray scar in its perpendicular meridian running from the limbus to almost the corneal center If this scar interferes with the

Fig 314

pupillary opening an optical iridectomy down and in will be performed It is usually necessary to do an optical iridectomy Vision with properly correcting glasses may range from 3/10 to 5/10 enough for the reading of coarse print Operations such as trephining into the anterior chamber with iridectomy have been tried but I do not favor them

This child is the next case (Fig 314) You see the protruding right eye shoved almost out from between the lids somewhat down and out You note the absence of all inflammatory signs There is no edema and no redness We can safely eliminate as cause a periostitis or a subperiosteal abscess The

blood examination has given no indication of a leukemia or a pseudoleukemia Nodules of this character then lying behind the eye may be excluded The Wassermann is negative the child s parents healthy and there are no stigmata of congenital lues a gumma may be excluded Examination of its sinuses fails to show any abscesses which may have broken into the orbital cavity *There is no necrosis of bone* and no *fistula* and with a general healthy condition in the child a tuberculous

F g 315 —Spe m n ts f y wh ch pe fi lly ppe rs rmal nt o ly On s d beg n g bo t 5 mm b y d the orn o le l j nct e s g l ly l b l ted rb tal ap lat d n f rm m s f t ss m as g 2 7 by 2 5 cm Th ma b be c sed The c t f ce pre nt fi g l r t ppl g s fo th m t p t t a lucent with b t m ll m e t l ce t gr y h ca e f p *bly myxomat u* d dem t s B se t f th b t sh d t t l a maly Photo-g aph w re t k of th pe m wh l a d aft b sect wh ch cl ded the ey ball

process scarcely comes into question We are almost by exclusion led to the diagnosis of retro orbital sarcoma The eye is blind and though at present of only *cosmetic inconvenience* will soon be shoved beyond the limits of protection on the part of the lids the cornea will become necrotic and the eye will be lost In palpating this eye we find that it cannot be shoved backward and not moved even in the direction upward and in

ward Ophthalmoscopic examination has shown an atrophic optic nerve The protrusion has existed according to the history for six months and was supposed to have first been noted following a paroxysm of whooping-cough It is of course possible that hemorrhage into the tumor mass took place at that time and that a rather sudden marked protrusion did

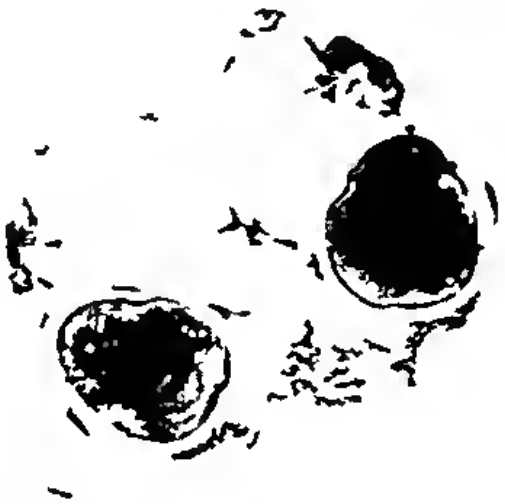

Fig 316 —Microscopic examination of the growth shows it to be distinct from the sclera in the region examined and also does not involve the mass of muscle adjacent to it This muscle however presents a certain amount of fibrosis The growth proper is of connective tissue type is divided into irregular compartments by bands of more fibrous less cellular connective tissue These included masses are composed of connective tissue cells more or less separated as if by edema giving a stellate appearance in places In other regions they are arranged more regularly in loose strands The protoplasm at times shows vacuolization the nuclei are relatively large the chromatic material is moderate in amount Mitotic figures are fairly numerous and atypical mitoses are occasionally observed Diagnosis Fibrosarcoma

occur As this eye is blind and as the tumor is from all the points in the history a rapidly growing one a total removal of eye and orbital contents is indicated We will proceed to the same I cut through the external palpebral commissure so as to give a little room and elevating the upper lid cut upward and through the conjunctiva to the periosteum and through it all along the supra-orbital ridge I repeat the same incision along

the infra orbital ridge join the two at the lid margin and introduce the periosteal elevator With this I go all around the wall of the orbital cavity going further and further back with my assistant pulling this cone of eye orbital tissues and periosteum forward Having at length accompanied by a good deal of hemorrhage reached the apex of the orbital cavity a stout lightly curved scissors is introduced and the apex of this cone cut off in the depths of the orbital cavity Profuse bleeding takes place from the many fine emissary periosteal veins and repeated fine cauterizations with a glowing cautery are made until the main seepage is stopped The cavity is now tightly packed with iodoform gauze and a bandage applied (Figs 315 316) The microscopic examination of this tumor mass will follow as a matter of routine As it seems thoroughly encapsulated it is probably a fibrosarcoma arising from the fascias or sheaths of the ocular muscles and the chances are good that the child will not hear from it again Granulations will spring up quickly filling the socket the lids be drawn in with the cilia turned toward the granulating masses and it is best to perform a Thiersch graft later joining the lids their edges containing the cilia first having been snipped off It will not be a pretty child and there is apt to be partial atrophy of that side of the face later

The next case is one of intra ar foreign body This man was struck on the eye by a b i while ering on a chisel A sharp pain occurred ery ss of v It is now two weeks since th The the body is localized and extracte ie ch r and fo eleterious effects deco ti ucts ign body The idenc only eration of the t the of the an perforatio ins s pitch b a somewha r to light all Fund vitreous ew small fi ts in the vit and to de

piece is probably located This localizing chart shows within a practically negligible amount of error the exact location and size of the piece To have this exact information is of tremendous value (Fig 317) The Sweet apparatus invented by Dr William Sweet of Philadelphia does this work admirably Every roentgenologist should he able to use it and can with a little practice You see that the piece is described as being 2 x 1 x 1 5 mm in size that its density is that of some metal

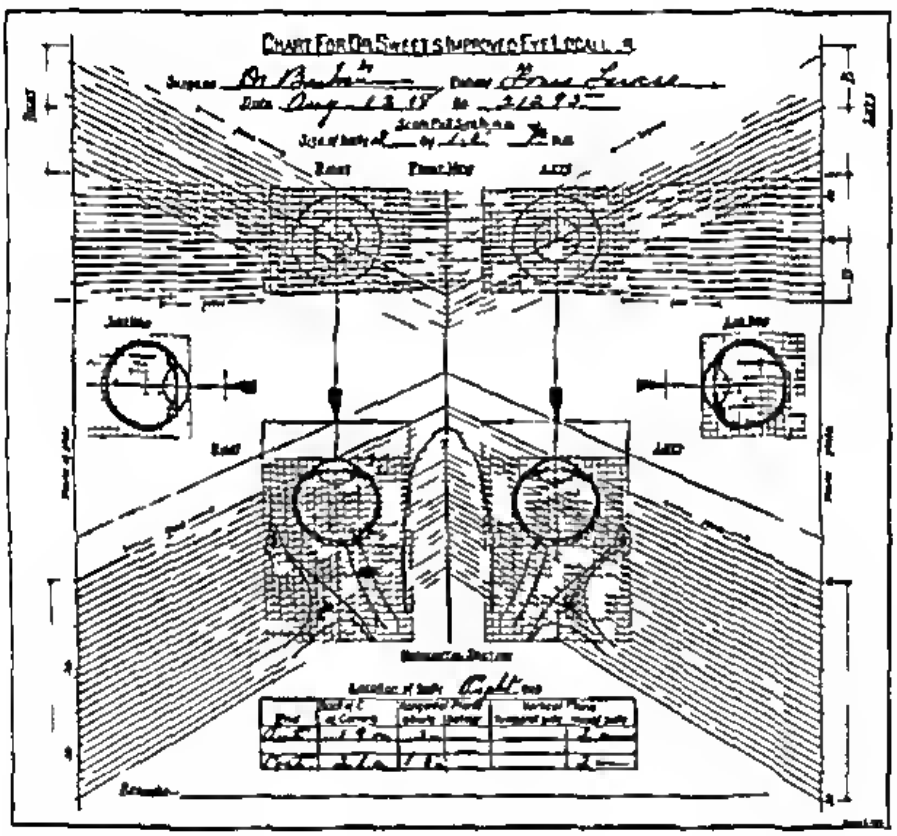

Fig 317 —Foreign body had been in eye two weeks was removed by magnet through scleral incision Magnet points put in over spot of localization

such as iron steel or copper and that it is located 19 mm in back of the cornea 2 mm to the nasal side of the midline of the eye and 5 mm above the horizontal plane From the history of his employment we can safely assume that it is a metal possessing magnetic qualities and proceed to extract it with the giant magnet The choice of routes of approach presents itself Shall we attempt to pull it out along its road of ingress or shall we make an opening into the eyeball as near to the piece as possible

the infra orbital ridge join the two at the lid margin and introduce the periosteal elevator With this I go all around the wall of the orbital cavity going further and further back with my assistant pulling the cone of eye orbital tissues and periosteum forward Having at length accompanied by a good deal of hemorrhage reached the apex of the orbital cavity a stout slightly curved scissors is introduced and the apex of this cone cut off in the depths of the orbital cavity Profuse bleeding takes place from the many fine emissary periosteal veins and repeated fine cauterizations with a glowing cautery are made until the main seepage is stopped The cavity is now tightly packed with iodoform gauze and a bandage applied (Figs 315 316) The microscopic examination of this tumor mass will follow as a matter of routine As it seems thoroughly encapsulated it is probably a fibrosarcoma arising from the fascias or sheaths of the ocular muscles and the chances are good that the child will not hear from it again Granulations will spring up quickly filling the socket the lids be drawn in with the cilia turned toward the granulating masses and it is best to perform a Thiersch graft later joining the lids their edges containing the cilia first having been snipped off It will not be a pretty child and there is apt to be partial atrophy of that side of the face later

The next case is one of intra ocular foreign body This man was struck on the eye by a bit of steel while hammering on a chisel A sharp pain occurred but no very great lo s of vision It is now two weeks since the injury The sooner the foreign body is localized and extracted the less the chance for infection and for the deleterious effects of chemical decomposition products of the foreign body The external evidences of injury are only a slight laceration of the cornea at just the temporal side of the pupil a clean perforation through the iris showing as a pitch black triangle a somewhat dilated pupil reacting slowly to light and that is all Fundu examination showed a few vitreous opacities a few small floating blood clots and a haze in the vitreous far back and to the temporal side where the

making a conjunctival flap at the upper limbus exposing the sclera and even a small rim of the cornea This small 1 mm trephine is placed so as to include both sclera and cornea and with a few rapid turns a button is drilled out of the sclera and cornea The operator knows when he is through for the patient at that moment winces slightly and one sees the pupil draw upward The trephine removed the button swings upward like a trap door and into the hole falls a greater or less amount of iris With one snip of the scissor this iris hernia and the button are removed The conjunctival flap is replaced and the lids closed I have never had occasion to suture the conjunctiva If it is properly put in place the lid raised and laid down gently

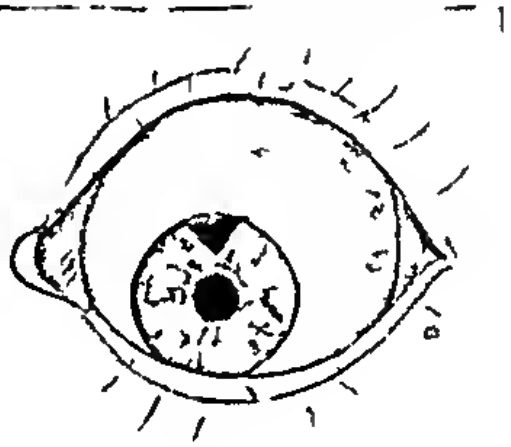

Fig 318

over it it does not roll back Aqueous will now percolate through this hole and in a few days a small raised cushion of conjunctiva lies over the hole The aqueous is absorbed by the lymphatics of the conjunctiva and the eye remains soft The one great objection to this operation is danger of late infection A catarrh of the nose a conjunctivitis may cause by virtue of organisms penetrating into this watery cushion acute virulent infection of the eye I have seen 2 such cases recently While admitting that it is a danger I believe that if the cases are properly selected the danger is very slight I never do this operation in very old people whose conjunctiva is often thin as gossamer having lost its fat with the general loss of fat in old age I do not do it in

anatomically correct if secondary dislocation has occurred Of still less frequent incidence but of particular interest because it combines the two above mentioned lesions is the injury usually known as *anterior dislocation of the os lunatum with fracture of the os naviculare* This differs from uncomplicated dislocation of the lunate only in that the proximal fragment of the fractured navicular remains with the lunate while the distal fragment keeps its contact with the other carpal bones In addition to these three relatively common lesions there is a large variety of

Fig 319 — Dislocation of lunate when ligamentous only is ruptured early a posterior dislocation of capitate *R* Radius *L* lunate *C* capitate *M* metacarpal

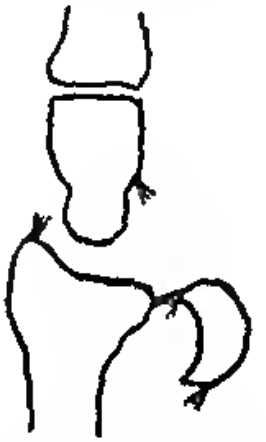

Fig 320 —Secondary dislocation of lunate after rupture of posterior ligamentous capitate plea lunate and anterior dislocation of radius

atypical fractures and dislocations which are of interest mainly because of their rarity

I will present 4 case histories to illustrate the late results of carpal injuries Two patients suffered from dislocation of the lunate with fracture of the navicular and they offer an interesting contrast between the results of early and late diagnosis and treatment The third and fourth patients had atypical lesions which were promptly recognized and treated their histories are presented not only because these fracture-dislocations have not been described in the literature but also because of the excellent results obtained by early closed reduction

CASE REPORTS

Case I Anterior Dislocation of Lunate and Proximal Fragment of Fractured Navicular, Fracture of Ulnar Styloid, Head of Radius, and Coronoid Process of Ulna, Compression of Median Nerve Closed Reduction on Third Day Physiotherapy Complete Restoration of Function—Mrs J R (Disp No 104 734) a waitress aged thirty one years was admitted to Lane Hospital on April 17, 1922 She had that morning been struck by an automobile which threw her against a wall The force of the fall had been received on the palm of the right hand, with the wrist and elbow in full extension She complained of severe pain in the right wrist and elbow and of tingling sensations in all but the little finger

Examination—The hand was in claw position with the wrist half extended and the fingers partly flexed The wrist was slightly swollen and considerably thickened in the anteroposterior direction The lower ends of the radius and ulna appeared to be intact and normal except for tenderness on pressure over the ulnar styloid There was an indefinite hard prominence under the flexor tendons and distal to the forearm bones Pressure here caused sharp pain in the distribution of the median nerve in which there was considerable diminution in the ability to feel cotton and pin prick On the dorsum of the wrist between the base of the third metacarpal bone and the lower end of the radius there was another hard prominence The distance from the posterior margin of the articular surface of the radius to the base of the third metacarpal was 1 cm less on the right than on the left The base of the first metacarpal approached the radial styloid so closely that a finger tip could not be inserted between the two bones The patient would not attempt to move the wrist or fingers There was marked restriction of passive extension of the fingers At the wrist there was passive flexion to about 30 degrees but there was no extension radial flexion or ulnar flexion

The clinical diagnosis of the wrist condition was anterior dislocation of the lunate This was based on (1) the normal relationship of the styloid processes (2) the anteroposterior thick

1922 four months after the injury the patient reported at the clinic for another complaint Examination showed that all tenderness in the navicular region had disappeared that the sensory disturbances were gone and that the wrist appeared to be perfectly normal except for slight limitation of extension and ulnar flexion In roentgenograms made on that day the navicular fragments seen in the anterior projection are in good position but there is no bony union The absence of tenderness or mobility in the navicular region makes it probable that fibrous union has occurred The lateral projection (Fig 324) shows the forearm and carpal bones in normal position

Fig 324—Obs 1 Lateral projection of forearm and carpal bones

Today ten months after the injury the wrists look precisely alike The grip of the right hand is stronger than that of the left The patient says that after an especially hard day's work the wrist is sometimes a little lame but that ordinarily she is not conscious that it has ever been hurt

Case II Anterior Dislocation of Lunate and Proximal Fragment of Fractured Navicular Median Nerve Injury Paresis Anesthesia and Severe Causalgia Late Excision of Dislocated Bones Physiotherapy Poor Functional Result—Mr W J H (Disp No 79 650) a sign painter aged forty five years was seen in consultation with Dr Leonard W Ely at the Marine Hospital of San Francisco on November 13 1919 Dr Ely had

diagnosed the fracture dislocation and wanted an opinion on the condition of the median nerve

History.—Five weeks previously on October 10th the patient fell 30 feet on to the palm of the extended hand. Shortly afterward he noticed tingling and numbness in all but the little finger. The wrist rapidly became swollen and it was impossible to move the wrist or fingers. The patient stated that a roentgenogram taken that day was reported to be negative. Twelve hours after the accident he began to suffer from severe burning pain in the hand which had continued without cessation making sleep impossible. He had found that warm water slightly relieved the causalgia.

Examination.—The patient was apprehensive and was evidently suffering severe pain. The right forearm and hand were on a wooden splint and were covered with moist gauze on to which he frequently dropped warm water from a sponge. The soft parts were markedly swollen and the skin was macerated. The wrist was slightly extended and the fingers were partly flexed. There was no voluntary motion of fingers or wrist. Passive motion of the wrist was limited to a few degrees of palmar flexion. The radial and ulnar styloid processes were in normal position. No carpal landmarks could be made out because of the edema of the soft parts but there seemed to be considerable anteroposterior thickening of the wrist. There was constant fibrillary twitching of the muscles of the thenar eminence. All forms of sensation were lost in the distribution of the median nerve to the hand. Pressing over the course of the nerve in the arm caused aggravation of the causalgia. After the right hand had been exposed to the air for an hour it was much warmer than the left and the skin was red and glossy. The nails of all except the little finger showed dull surfaces and transverse ridges.

Roentgenograms taken at the Marine Hospital are shown in Figs. 325–327. In the anterior projection it is seen that the navicular is fractured and that the proximal fragment is rotated and with the lunate dislocated forward. The lateral projection shows that the capitate and other carpal bones are dislocated

backward and that the lunate and proximal navicular fragment have not retained their proper relationship to the radius and ulna but have been secondarily dislocated forward In this

Fig 325—Obs 2 A typical dislocated fragment of fracture dislocation At operation

process the lunate has rotated slightly forward and the proximal navicular has rotated almost 90 degrees backward

Fig 326

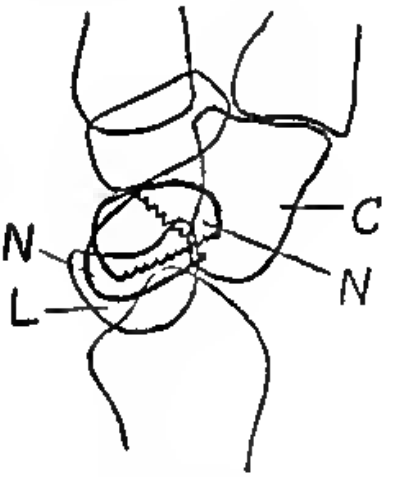

Fig 327

Figs 326 327—Obs 2 Lateral projection Fig 327 is a tracing of Fig 326 *L* Lunate *N* proximal navicular *N* distal navicular *C* capitate

Treatment and Result—It was not possible to reduce the fracture dislocation On November 21st Dr Ely excised the lunate and proximal fragment of the navicular through a volar incision The median nerve throughout the length of the

incision was of normal size and showed no evidence of compression except a moderate hyperemia

For two days after operation the causalgia was very severe, then it gradually disappeared Four weeks after operation the sensory loss palsy of the small muscles of the hand and vasomotor disturbances were unchanged With subsidence of the swelling of the soft parts it was evident that there was a good deal of atrophy of the thenar muscles The wrist had 45 degrees of palmar flexion 10 degrees of ulnar flexion and no extension or radial flexion From December 27th onward the wrist and fingers received daily baking massage passive motion and exercises in the Physiotherapy Department of Stanford Hospital During the second month after operation there was slight improvement in the domain of the median nerve but none in the motions of the wrist By the first of March 1920 the patient could flex the finger tips to within ¾ inch of the palm and oppose the thumb and little finger The strength of the hand was sufficient so that he could cut meat with a sharp knife and could hold a match firmly enough to strike it The sensory disturbance had cleared over the palm and thumb but had not changed over the index middle and ring fingers The hand was still warm moist and slightly cyanotic and the finger nails were growing very slowly The wrist was not improving and it hampered him in his work He had learned to use the left hand when wrist motions were required as in painting the letter O

It was felt that the absolute restriction of radial and dorsal flexion was due to the presence of the distal fragment of the navicular (Fig 328) The patient entered Lane Hospital where on March 13 1920 Dr Ely excised this bone through a lateral incision Figure 329 is a roentgenogram of the wrist taken after the second operation Physiotherapy was continued Six weeks after the second operation he returned to work In July 1920 palmar flexion was almost normal ulnar flexion was less than half of normal and extension and radial flexion were absent There had been no improvement in the sensory loss He had cut the tip of the index finger deeply with

out feeling pain In March 1921 a year after the second operation it was evident that no further improvement in the function of the wrist joint was to be expected Flexion of the fingers and opposition of the thumb were weak and the volume of the thenar muscles was less on the right than on the left No change

Fig 328—Case 2 Anteroposterior projection first operation

had taken place in the sensory loss or in the motions of the wrist during the previous eight months The education of the left hand had progressed so that he carried on his trade without difficulty

Fig 329—Case 2 Anteroposterior projection second operation

Discussion of Observations of Cases I and II—The roentgenograms show that the lesions of these two patients were almost precisely similar It would not be fair however to say that the difference in the final result is entirely due to early reduction in one instance and late excision of the bones in the

other for this would leave out of account the loss of function resulting from the median nerve injury The first patient's full range of wrist motions may be attributed to early reduction and proper after treatment The second patient's restriction of wrist motion is certainly due to the delay in diagnosis which made excision of the bones necessary and it occurred in spite of similar after treatment But the weakness of the hand muscles supplied by the median nerve was a considerable factor in the poor functional result which the first patient showed six teen months after injury Whether the nerve lesion would have been less severe had an early reduction been done is prob lematic

Anterior dislocation of the wrist with or without fracture of the navicular is almost invariably accompanied by some de gree of median nerve compression Tavernier [1] who first em phasized this fact says that signs of nerve injury are of great diagnostic importance The carpal canal through which the flexor tendons of the fingers and the median nerve pass is bounded in front by the anterior annular ligament and in back by the carpal bones The posterior annular ligament lies on the dorsal aspect of the carpal bones When the lunate lies in the same plane with and anterior to the capitate (Figs 323 327) the carpal canal is narrowed and the anterior edge of the lunate presses on the nerve and tendons Rarely are the symptoms of nerve compression so severe as to dominate the picture as in the second observation Delbet[2] has described a severe median causalgia which was cured by removal of the dislocated lunate and navicular fragment in this instance also the nerve was not grossly abnormal

Case III A Hitherto Undescribed Lesion, Anterior Dis location of Proximal Fragment of Fractured Navicular Pos terior Dislocation of Lower End of Ulna Median Nerve Com pression Closed Reduction on Second Day Excellent Func tional Result (I am indebted to Dr Alanson Weeks of San Francisco for permission to publish this case report)—Mr W T R (Hosp No 21 473) a marine engineer aged fifty years

entered Stanford University Hospital August 25 1920 On that morning while lying prone with his hand palm downward on the deck he received a direct blow on the dorsum of the left wrist from the edge of an iron door 2 feet square and ¼ inch thick which fell a distance of about 7 feet He found that he could move his wrist and fingers normally He noticed a small hard tumor on the flexor aspect of the wrist All but the little finger soon became numb A few hour after receipt of the injury a transverse lacerated wound which exposed the posterior annular ligament was sutured by Dr Leroy Brooks

Roentgenograms —The anterior projection (Fig 330) shows a transverse fracture of the navicular In the lateral projection

Fig 330—Ob 3 Ant d l t f p m l f gm t f f t d l At p j t

(Figs 331 332) it is seen that the proximal fragment of the navicular is dislocated forward while the lunate retains its normal relationship to the capitate and to the bones of the forearm There is also a backward dislocation of the lower end of the ulna

Treatment and Result —On August 26th twenty four hours after the accident the patient was anesthetized and a closed reduction was done by Dr Weeks The wrist was immobilized on an anterior wooden splint The lateral roentgenogram shows that the dislocated fragment is in place but somewhat posteriorly rotated (Fig 333) The dorsal wound healed without

suppuration The hypoesthesia in the median distribution cleared rapidly and was barely demonstrable four days after reduction The range of wrist motions improved gradually

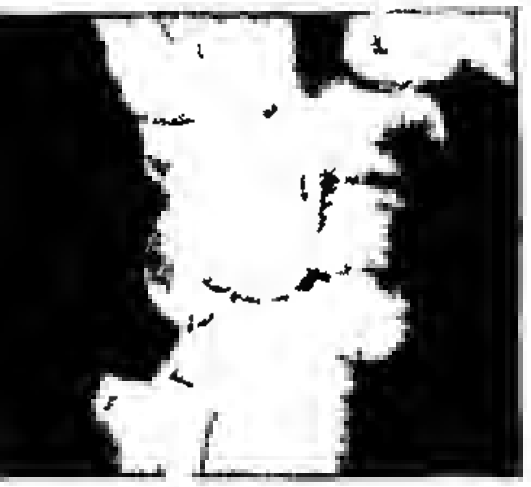

Fig 331

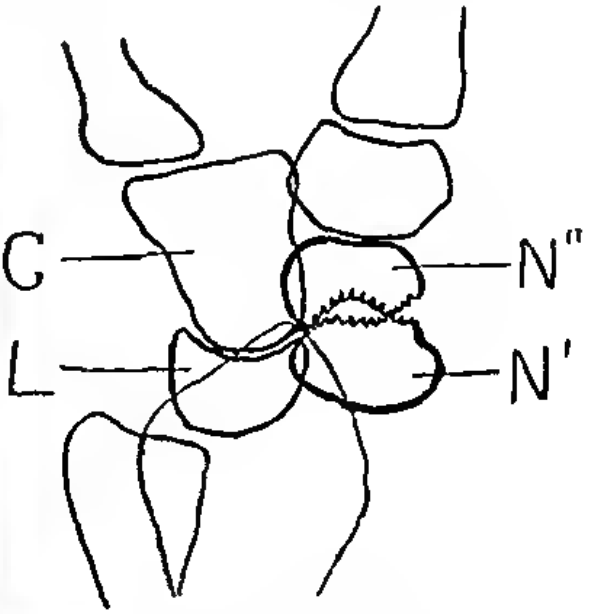

Fig 332

Figs 331 332 —Obs 3 Lateral projection Fig 332 is a tracing of Fig 331 *L* Lunate *N* proximal navicular *N* distal navicular *C* capitate

Fig 333 —Obs 3 Lateral projection after reduction

In December 1920 the patient reported by letter to Dr Weeks that he was carrying on his work with a useful and painless wrist At the present time two and a half years after the accident he

is at sea His wife stated that the wrist is sometimes a little painful and that a few months ago following further trauma it was swollen for several weeks

Discussion—I have not been able to find a record of a similar lesion in the literature Riedl[3] and Ludloff have reported anterior dislocations of the intact navicular Auvray[5] has described posterior dislocation of the distal fragment of a fractured navicular and quoted a similar observation by De Fortunet

This lesion was produced by direct violence to the dorsum of the wrist probably combined with torsion as indicated by the site of the wound and by the dislocation of the lower end of the ulna

Case IV A Hitherto Undescribed Midcarpal Fracture dislocation Peri triquetro lunate Anterior Dislocation of the Hand with Fracture of the Navicular Closed Reduction Physiotherapy Perfect Functional Result—E K (Disp No 78 560) a boy aged eleven years entered the Surgical Clinic of the Stanford Out patient Department on June 3 1921 complaining of a sprained left wrist Ten days before on May 24th he tripped and fell on the palm of the hand Examination showed that the wrist was slightly swollen and that there was tenderness on pressure over the navicular bone A diagnosis of fracture of the navicular was confirmed by the roentgenograms (Figs 334 335) and the wrist was immobilized in the line of the forearm by means of a molded plaster splint Seventeen days later (June 20th) the splint was discarded

On July 9 1921 the patient returned to the clinic with a marked deformity of the left wrist which had occurred as a result of hyperextension during a scuffle a few hours previously Further questioning brought out the fact that the same deformity had followed the original injury on May 24th At that time his mother bad made the bone snap back in place by pressure on the front and the back of the wrist While the wrist was flexed the bones stayed in position but when it was extended beyond the line of the forearm the dislocation recurred

He frequently produced and
any pain during the next few
clinic on June 3d because a
boy had a broken rather than a
patient did not produce or
roentgenograms of that day
navicular After the removal of
extend the wrist without
occur again until July 9th

Examination —There was
of the wrist with bony

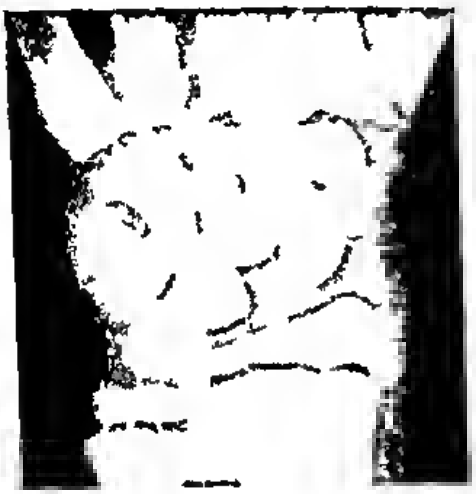

Fig 334 —Obs 4 Anterior projection of June 3d fracture of navicular

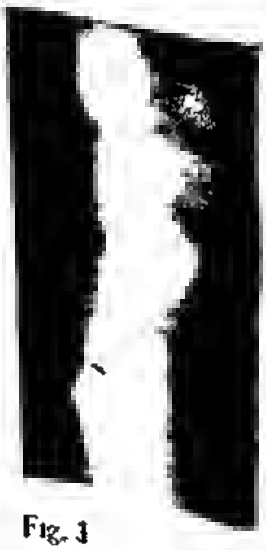

Fig. 3
jection of J
ular no d

aspects The bases of the metacarpal bone
ward The wrist was shortened so that
metacarpal bone was about half the norm
posterior margin of the articular surface
lower ends of the radius and ulna appeared
dorsum of the wrist the transverse ridge
the radius and ulna but by the proximal
Distal to the ridge there was a depression
tensor tendons of the fingers passed The
easy to palpate but it seemed to be form
of carpal bones The range of motion of

slightly restricted There was no voluntary motion of the wrist and passive motion was markedly limited There were no signs of nerve compression Slight traction with pressure on

Fig 336—Obs 4 A t p oj ct o f J ly 9th midca p l a ter r d locat on w th f ct e f v cula Compare w th Fig 334

the bony prominences reduced the dislocation but when the wrist was extended beyond the line of the forearm the deformity re

Fig 337

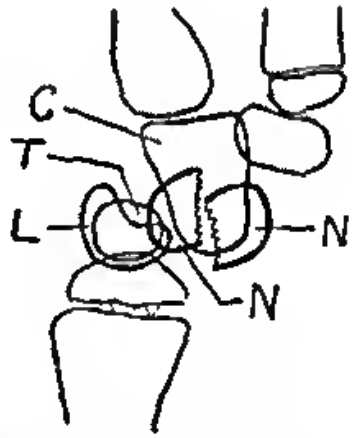

Fig 338

Figs 337 338—Ob 4 Lat ral p oj ct on f July 9th Fig 338 is a t g f Fig 337 C mp w th Fig 335 *L* L nate *T* t q etrum *N* p x mal l r *N* d tal navi l *C* cap tate

curred The diagnosis was midcarpal anterior dislocation of the hand

Roentgenograms (Figs 336–338) —The lunate and triquetrum

(cuneiform) lie in normal relationship to the forearm bones The distal row of carpal bones accompanied by the fractured navicular is dislocated forward The distal fragment of the navicular is displaced upward but the proximal fragment remains in normal contact with the capitate

Treatment and Result —After reduction of the dislocation on July 9th the wrist was immobilized in the flexed position by means of a circular plaster dressing Ten days later the plaster was cut and removed while active motions of the wrist were carried out This was repeated three times a week On the twentieth day the plaster dressing was discarded and a posterior wooden splint was applied for the next ten days On August 6th there was no lateral motion or extension and flexion of only 10 degrees A roentgenogram (Fig 339) made on that day shows the carpal bones in normal position

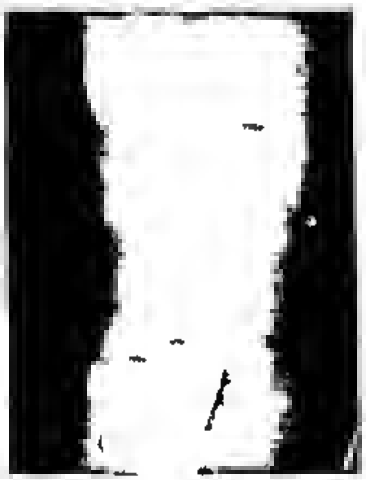

Fig 339 —Obs 4 Lateral projection after reduction

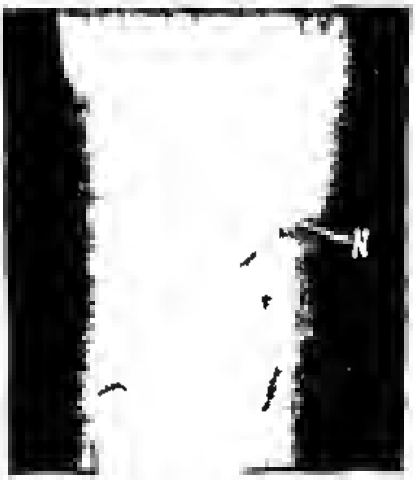

Fig 340 —Lateral projection seven months after injury to show bony union of navicular (*N*)

From the middle of August until the middle of October the patient reported twice a week to the Physiotherapy Department of Stanford Hospital for baking massage aerated baths and exercises On October 15th three months after reduction there was almost complete range of wrist motions and the strength of the wrist was only slightly below normal Pressure over the navicular did not cause pain A roentgenogram taken

on February 11 1922 seven months after the injury shows bony union of the navicular (Fig 340) There was no difference in the appearance in the range of motion or in the strength of the two wrists Today twenty months after reduction it is impossible to detect the injured wrist without referring to the roentgenograms

Discussion—I have found in the literature 6 instances of mid carpal anterior dislocation of the hand which were controlled by roentgenograms and sufficiently described to make the pathology unmistakable All of these lesions differ in some respect from that detailed above In three observations those of Goulhoud and Arcelin [6] Mouchet and Vennin[7] and Tanton [8] the proximal fragment of the navicular lunate and triquetrum remained in normal position while the distal row accompanied by the distal fragment of the navicular was dislocated forward Cotte[9] has described an anterior dislocation of the distal row accompanied by the intact navicular and triquetrum while the lunate only remained in place Tilmann[10] has reported a true midcarpal dislocation in which the proximal row of carpal bones remained in position and the distal row was anteriorly dislocated Douarre's[11] patient showed the lunate and triquetrum in normal position while the distal row accompanied by the intact navicular was anteriorly dislocated

Aside from its interest as a rarity this observation seems to be of importance from two other points of view It is said that if any union takes place in a fractured navicular it is fibrous union but the roentgenogram (Fig 340) shows clearly that true bony union occurred The perfect functional recovery though partly due to early reduction was undoubtedly greatly aided as in Observation I by the painstaking after treatment given in the Physiotherapy Department under the direction of Dr H L Langnecker

Conclusion—The practical importance of the subject lies in the fact that an unrecognized and untreated anterior dislocation of the lunate with or without fracture of the navicular gives a gloomy prognosis as illustrated by Observation II while early reduction and appropriate after treatment of these or of the

rarer lesions offers an excellent outlook as shown by the other three observations

How then are these lesions to be recognized? The clinical signs are sometimes clear cut as in Observation I—intact lower ends of the forearm bones anteroposterior thickening and shortening of the wrist claw hand and signs of median nerve compression But again as in Observation II the swelling of the soft parts obscures the landmarks Therefore in every instance anterior and lateral roentgenograms are essential and they require careful study and comparison with films of the normal wrist for it is probable that no roentgenogram is more difficult to interpret than is a lateral view of the carpus

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CLINIC OF DR S L HAAS

STANFORD UNIVERSITY HOSPITAL

THE IDEAL BONE GRAFT AS DETERMINED BY EXPERIMENTAL INVESTIGATIONS

A CONSIDERABLE amount of discussion has arisen in regard to the most suitable form of bone for transplantation Thus, there are numerous expressions of opinions between the two extreme views of those on the one hand who maintain that the graft should consist of a live piece of bone to those on the other hand who maintain that it is of no significance whether the bone is dead or alive It cannot be denied that successful results may be obtained with dead bone or even a foreign substance but in spite of such results there may be under unfavorable circumstances preventable failures It is difficult to draw definite conclusions from the results of operations on patients because of the variations in the conditions existing at operation such as the character of the bone and surrounding tissues the health of the patient and the variation in the type of the operation It is believed that the results obtained from experiments on animals present more definite criteria for judging the behavior of the various kinds of grafts because of the possibility of more uniform conditions and the opportunity of microscopic study of the various changes Due consideration must be allowed for the possibility of greater reparative and regenerative power of the lower animals as well as a variation in different animals

It may be well to recall briefly the changes that take place in a piece of bone after transplantation In consequence of the sudden cessation of the blood supply there is an immediate degeneration of some of the cells while others because of their greater viability are able to survive In about ten to twenty

days one is able to distinguish definite signs of regeneration in the region of the periosteum endosteum about the lining of the haversian canals and on the outer surface of the trabeculæ from which foci there is a gradual progression to the complete regeneration of the bone The changes just enumerated take place in bone that is buried in muscle and removed from any possible source of invasion of bone Some investigators maintain that the new bone arises from the surrounding connective tissue by a process of metaplasia

It is of considerable practical as well as of scientific interest to know whether the transplant remains alive and is capable of forming callus because the successful application of the bone graft necessitates the union of the graft at one or both ends with the host in other words the healing of a fracture in which one fragment is represented by the host and the other fragment by the graft If the graft is dead then all the uniting callus must be formed by the host but if the graft is alive then it may share in the process of union It can be proved that a transplanted bone is capable of forming callus by placing a bone that has been broken in muscle It will be found that the two fragments will unite in a similar manner as a fracture under ordinary conditions That this property of forming callus is dependent upon live bone can be proved by placing a fractured dead bone in muscle and it will be found that there will be no attempt at repair or signs of activity at the site of fracture That the live transplanted bone has not only the property of forming callus but has definite invasive power can be shown by placing a live fragment of bone in contact with a dead piece of bone in muscle It will be found under favorable conditions that there will be a union of the two fragments and that there will be live finger like processes penetrating the dead bone It is believed that these experimental findings firmly establish the independent power of regeneration inherent in transplanted bone

Certain cells of transplanted bone not only live as in the usual method of transplantation but in addition are capable of withstanding a varying exposure period under different environments It has been found that union will occur in a trans

planted fractured bone that has previously been exposed to air in a sterile bottle for nineteen hours Furthermore definite signs of proliferation both osteoid and cartilaginous have been found at the site of fracture in a transplanted bone that had been exposed to a freezing temperature for three days These facts offer uncontroverted evidence of the retained living property of the osteogenetic cells of transplanted bone

Another mooted point in regard to the transplanted bone is concerned with the advisability of having the periosteum and endosteum attached to the graft Utilizing the fact that a fractured transplanted bone will unite it was decided to determine the effect of the removal of the periosteum the endosteum or both on the healing of such fractures It was found that when the endosteum was curetted there was but a slight hindrance to healing that when the periosteum was removed the disturbance was more marked but when both periosteum and endosteum were removed there was always a failure of union and very slight evidence of activity about the fracture site Therefore it was concluded that it is preferable to have the periosteum and endosteum intact when the maximum of osteogenesis is desired in a bone graft

In view of the experimental findings it is deemed advisable to utilize the live bone with both periosteum and endosteum attached for all operative procedures necessitating the use of transplanted bone

CLINIC OF DR LUDWIG A EMGE

(In Collaboration with Dr C B Cowan)

Stanford University Hospital

AN EARLY BENIGN ADENOMA OF THE APPENDIX

It is surprising how little the literature has to offer us on early neoplasms of the appendix It is impossible to say how many thousands of appendices have been removed during the past decades The number must be very high and consequently one would expect to find a great deal of information regarding the very early stages of these new growths Unfortunately this is not the case We are safe in saying that the large majority of appendices removed were not studied microscopically in the past surgical eras A great deal of information has thus been lost to us so today there are only about 400 cases of neoplasm of the appendix on record It is significant that the vast majority of these about 90 per cent were discovered accidentally With the advent of better laboratory facilities these discoveries have increased It is therefore the last decade which marks a sud den increase in reports of neoplasms of the appendix which sig nifies rather a relative than an actual increase to be credited to the more universal adoption of examination of tissues removed and the increasing popularity of exploration in the course of any abdominal operation These procedures have led to many ac cidental discoveries of pathologic structures mainly neoplasms which while they had no bearing upon the symptomatic dis turbance of the patient at the time would have soon endangered life had they been allowed to remain For many years the De partment of Obstetrics and Gynecology of the Stanford School of Medicine has followed this routine of exploring the abdomen and examining tissues and in the course of time invaluable information has been collected

It was at the occasion of a pelvic operation that the inspection of the appendix revealed a sharply circumscribed globular fairly solid tumor situated in the middle third of this intestine Its size although barely more than 1 5 cm in diameter and the fact that it was bound down tightly by old adhesions suggested that a chronic inflammation was present and that a fecal concretion had formed The appendix was therefore removed but not measured until hardened in a formaldehyd fixative

The patient a woman of thirty nine had no recollection of any intestinal disturbances She came to operation on account of extensive plastic derangements of the generative organs secondary to birth trauma In connection with our findings in the appendix to be reported presently it is of interest to note that this patient also had an advanced polypoid hyperplasia of the endometrium bordering on adenoma and a polypo is of the nasal mucosa In other words she presented a tendency to hyperplasia of mucous membranes in general

The hardened appendix dusky from general congestion and covered with firm adhesions measured 4 cm in length The greater portion of the middle third was occupied by the tumor mass described and at operation thought to be a fecal concretion When sectioned at various level it seemed that the lumen of the organ was completely obliterated except in its middle third where it was distended and filled with a circumscribed mass suggesti e of glandular ti sue Sections for microscopic study were then cut from various levels the portion housing the tumor being sectioned serially

The study of the sections from the regions directly below and above the tumor mass revealed an old chronic obliterative appendiciti In the proximal third the lumen had been completely obliterated by a fibrous cord Glandular and lymphoid structures could not be found There were a number of plasma cells and polymorphonuclear leukocytes present In the distal third (Fig 341) the lumen although reduced to half of the normal width was still patent for a distance of about 0 5 cm just above the tumor It was lined with a mucosa containing few remnants of glandular structures Lymph follicles were still

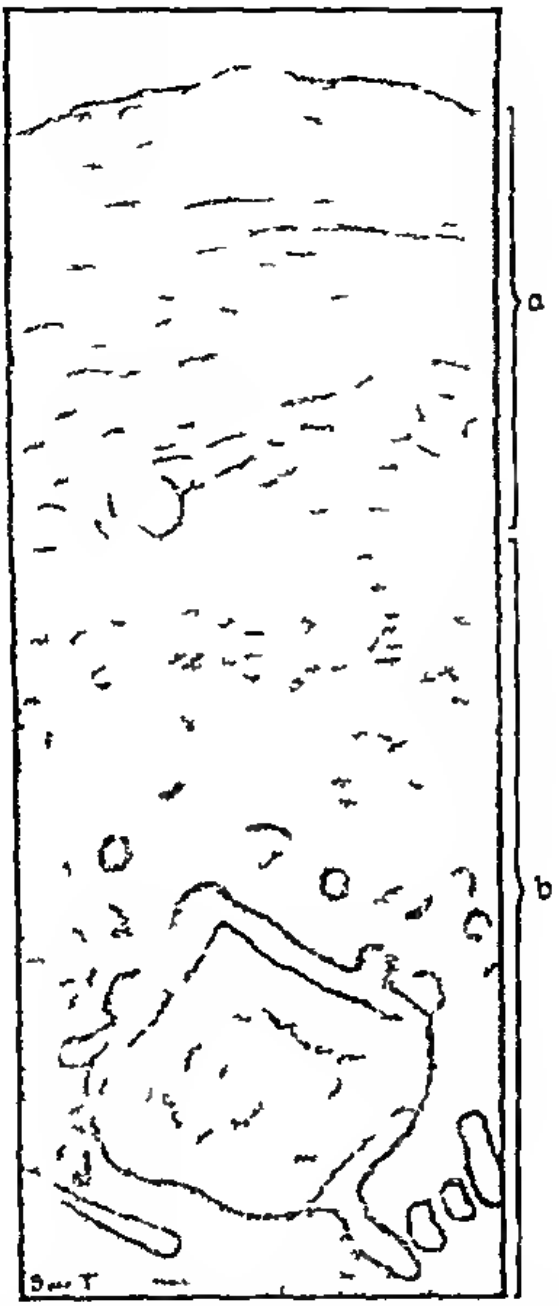


Fig 341 —A very low magnification of a section through the distal third of the appendix a The muscle wall is thin but the submucous connective tissue is increased b mucosal glands are displaced and scarce Lumen is small and filled with necrotic tissue Lymph follicles are present Under higher magnification it was seen that a portion of the mucous lining in the lumen was destroyed At this level the appendix presented a picture of an obliterative chronic append

abundant The lumin contained necrotic cellular material mixed with pus cells Polymorphonuclear eosinophils were abundant in this portion of the appendix The remaining por

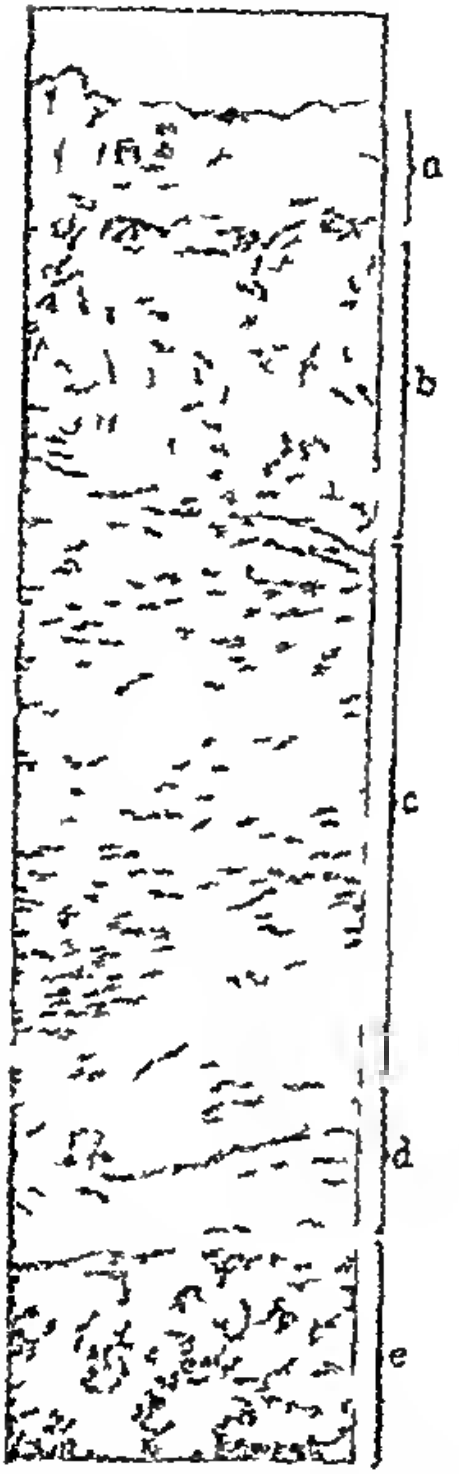


Fig 342 —A sect n taken th ough th middle th d of th append x and showing th port ns nea t th m tery and se n und r l w mag n ficat on *a* Serosa *b* muscular l y r the latter l ghtly thinned out *c* greatly hypertroph ed submucosa tra f rmed nto a p uf *d* the vascul r layer of the capsul from wh h pr ng the support g co nect t e tructu for the gland lar e mpon nt *e* port on of th tumo ma s

tion of the distal third presented the same picture described for the proximal third

The middle third of the appendix was for the greater part occupied by a glandular tumor mass enveloped in a capsule which, although irregular in outline seemed to be intact except where it bordered the reduced lumen of the distal third This structure apparently sprung from the submucosa and by hypertrophy and fibrosis ultimately formed a capsule sharply differentiated from the surrounding muscle wall Both the capsule and the muscle wall had their greatest thickness at either side of the mesenteric attachment (Fig 342) and their greatest thinness farthest away from it A muscularis mucosæ could not be seen Within the capsule was a mass of glandular structures irregular in shape and size the components of which were well supported by connective tissue walls At the periphery of this glandular mass there were well-defined and thickly packed lymph follicles similar in appearance to those usually seen in any appendix All of these follicles were within the confines of the capsule The greatest portion of blood and lymph supply was situated in the wall of the capsule being most numerous where it was thickest The glandular mass had only a very scanty blood supply The serosa of the appendix in this region did not present anything unusual except for signs of vascular stasis

Under high magnification it was easily seen that the supporting connective tissue of the glandular components of the tumor took its origin from the innermost layer of the capsule (Fig 343) The connective tissue cells were well formed and mature often stellate and interlacing (Fig 344) Distributed throughout this supporting network of connective tissue there were many polymorphonuclear eosinophils

The glandular components when studied at one level were of irregular outline and varied greatly in size (Fig 343) There were from a few to a hundred of these components seen in one field according to the width of the level Each component or alveolus consisted of from 20 to 200 cells when seen in cross section The larger glandular masses were confluent and the majority of the glands were solid Many contained vacuolated

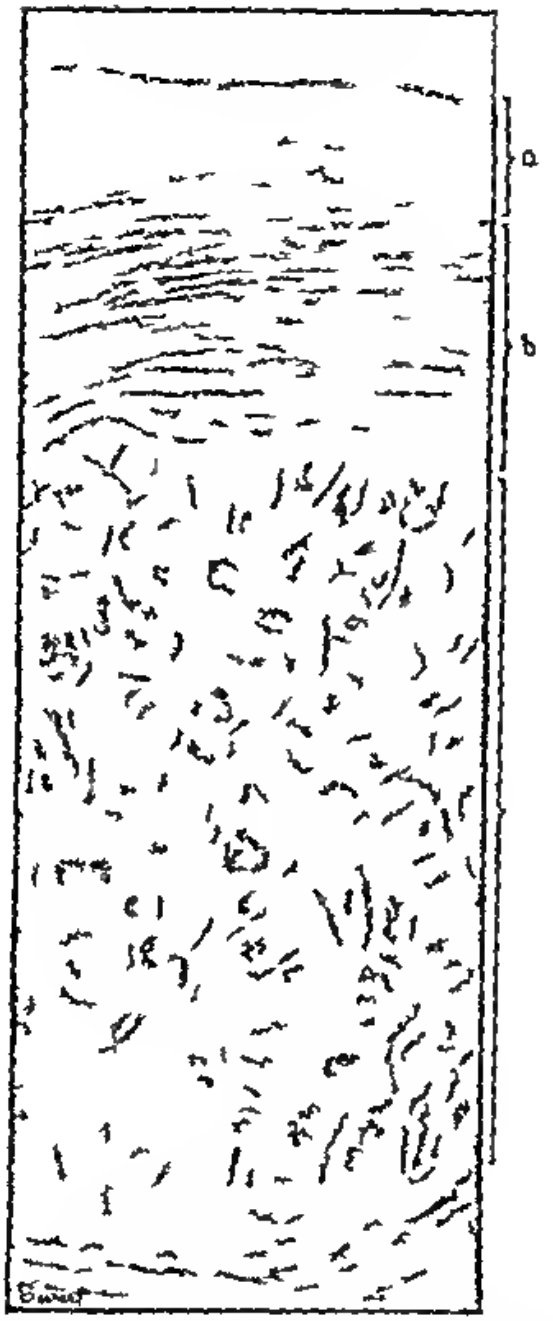
F g 343 —Sect n f m th m l l f F g 342 but se n under h gh m gn ficat on and how ng th cap l nd m sc lar fa the t way f m th me ntery wher th y w r th n t Th gl dula omp n nt can be se n clearly defined a d vary ng n Th h rp d m cat on f th glandular m s cl fy Muscul nd r sa b cap l c turn r mas

bodies of various sizes simulating lumina (Fig 344) These bodies we interpreted as an accumulation of secretory material Their size determined the relation of the cells to the stroma

When a number of these vacuolated bodies had become confluent near the center of a glandular component the cells were crowded toward the stroma and the glandular mass assumed true acini formation Such a configuration was comparatively rare in this

Fig 344 —A section from the same level as presented in Fig 342 but seen under very high magnification The long slender nuclei of the basement membrane cells are easily distinguished Vacuolated bodies can be seen everywhere In the two glandular components seen here secretory material is being stored toward the periphery of the component Note the uniformity of the nuclei as well as the absence of mitotic figures An attempt of some of the cells to arrange themselves at right angles to the basement membranes is seen in the glandular portion on the right Note the absence of goblet cells

tumor As a rule vacuolated bodies were distributed irregularly throughout the glandular component giving it a honeycombed appearance In many instances there was a tendency for these bodies to accumulate near the periphery rather than



F g 343 —Sect o from th ame le el of Fig 342 b t e n unde l gh r magnification nd show ng th cap ule a d muscular f the t aw f om the mesentery where thev we th e t Th gla dul c mpon nt can b se n cl ly defin d a d ry g Th h p d ma at n of th glandular ma lea ly see *a* M c l a d sa *b* cap l t mor mas

bodies of various sizes simulating lumina (Fig 344) These bodies we interpreted as an accumulation of secretory material Their size determined the relation of the cell to the stroma

(1) Individual cells of the glandular masses are all of the same type Goblet cells are not present A basement membrane is present Confluence of cell masses by breaking through this membrane is frequent

(2) Many of the secretory cells have an appearance similar to those of the mucosa of the normal appendix

(3) The tumor has a definite capsule derived from the sub mucous connective tissue of the appendix

(4) There is complete absence of demonstrable mytosis in the tumor mass

(5) There is no penetration of the capsule and no invasion of the vessels

(6) The tumor is bounded by an old chronic inflammatory process manifesting itself in obliterative appendicitis

In analyzing this tumor we decided to class it as a benign adenoma most likely originating from isolated cell nests of an inflamed appendix We justify this classification on the basis of the six criteria mentioned above Its inflammatory origin is highly suggestive and fits in well with Verse s theory of the origin of these tumors

When we attempted to classify this tumor we found that its cytologic picture would not fit in with either of the two general types of glandular tumors of the appendix known These two types are the malignant cylindric cell adenomas or gelat inous carcinomas typical of intestinal carcinoma in general and the relatively benign small cell adenomas or carcinoids which resemble the basal cell carcinomas of the skin The majority of appendical neoplasms belongs in the second group Primary gelatinous carcinomas of the appendix are comparatively rare There are only 25 of these reported in the literature The greater proportion of appendical neoplasms is obscured by intestinal new growth elsewhere Nevertheless it is safe to assume that all carcinoids and in fact every adenoma of the appendix may ultimately become definitely malignant although it may be slow in invading the surrounding viscera

The tumor described here does not belong in the first general class of appendical neoplasms since it is devoid of goblet cells It is excluded from the second group because it forms definite

glandular structures which are not found in carcinoids We therefore choose to class this tumor under the heading of benign adenoma although we do not deny that such a tumor must be considered precancerous in character and may constitute an aberrant type of the carcinoid group

In regard to its early clinical significance there is very little to say since it failed to give any appreciable symptoms This is true of any early neoplasms of the appendix which are symptomless until invasion of the surrounding viscera or marked distention of the primary organ has taken place It is said that occasionally mild symptoms of a chronic appendicitis will accompany these early tumors but there is no way to differentiate the two conditions Once invasion has taken place the symptomatology characterizes itself by a host of intestinal disorders that culminate in intestinal obstruction and commonly the tumor is easily detected The great majority of the early tumors are found accidentally Their relation to other neoplasms of the intestine is as 1 to 250 Various writers have estimated that ½ to 1 per cent of all appendices removed contain neoplasm of one sort or the other Slightly more than half of these tumors are found in women This is a relative finding and explained by the more frequent operative entrance of the female abdomen Seventy per cent of these tumors are found in the second third and fourth decades of life a period into which fall the greater number of abdominal operations

Since early neoplasms of the appendix and other organs give so little warning a plea is made that if feasible all abdominal organs be explored in the course of any abdominal operation This will be a decided step forward in prophylactic surgery It is furthermore asked that in the interest of science every appendix removed should be examined microscopically by a competent observer well trained in the interpretation of pathologic findings Excluding emergencies and purulent abdomens there is no excuse for not carefully exploring the abdominal viscera To *fail to examine tissues removed at* operation *merely* means to defeat science and keep surgery at a level of mechanical skill applied to human anatomy

CLINIC OF DR [illegible]

FROM THE DEPARTMENT OF [illegible], STANFORD UNIVERSITY [illegible]

CALCIFICATION IN BRAIN TUMORS

IN 1914 Schlesinger and Schuller[1] called attention to the relation of dural endotheliomata and even gliomata to overlying osteomata of the calvarium. Calcification in the pineal has long been known and may be an aid in diagnosis through its normal size (ruling out pineal tumor) or by displacement from the midline as Schuller has shown. Also calcified plaques in the falx (psammoma) are not so very rarely found postmortem. But of calcifications within the brain itself (including hemorrhagic cysts) I have found mention of only 38 cases in the literature. Taft[2] reports one discovered postmortem in the brain of a child with mental symptoms and cites cases reported by Bostroem, Mallory, Catola, Obendorfer and Durck, all extensive and discovered postmortem, the first some seventy years ago. Schuller[2] cites Lichtheim, Fittig, Grumach, Robinson, Alexander, Sterz and Stich as having seen areas of calcification in roentgenograms and himself adds 5 cases. Yet Schuller has only 3 head x rays in his collection. Murphy[4] cites Kehrer, Steida and Strater in addition and himself reports 2. Heuer and Dandy[5] found 6 cases of calcification in 11 destructive brain tumors. One of these may have been a glioma, the others were an osteosarcoma, an aneurysm of internal carotid, a cyst of Rathke's pouch, a tumor of optic nerve sheath, and calcification in hypophysis. They also note one basal calcification in the choroid plexus, one calcification in the falx and 17 cases of calcified pineal. Since then single cases have been reported by George[6] Souques[7] Bassoe and Hass-

Limouzi and Coville[9] and Miller[10] In discussing George's paper Manges reported 2 instances and George told of writing to 25 roentgenologists and eliciting only one more instance (by Bowen) Merrill[14] had a case of teratoma of the pineal containing bone Magnus in Christiania reported a case but the publication is not readily available (Norsk. Mag f Laegevidensk. 82 797 November 1921) Marburg and Ranzi[11] reported 318 cases of proved brain tumor (1901–19) with x ray findings positive in only 33 But they do not say how many if any of these 33 were calcified Clarke[12] has reported 99 cases of brain tumor and Locke[13] 107 verified and 60 unverified cases yet neither of them mentions calcification being concerned with classification and prognosis

Report On One Year's Cases—In the year 1922 this department examined 242 head cases (exclusive of sinus examinations) Of these 227 sets of films were available for study These comprise

B t m fi d	9 case
B t m r fi d	6
B t mo s pects	39
Id path p l psy	19
Cl lly n t m r	10
C rta ly no t mo	52

(The suspects include all cases without a definite non tumor diagnosis many diagnosed merely headache The epilepsies may contain some actual but unrecognized tumors The clinically non tumors cover many psychosis and encephalitis cases The certainly non tumors are confined to cases of fracture and suspected fracture and 2 cases examined to complete the study of the skeleton in Paget's disease The tumors include hypophyseal growths but exclude sarcoma of jaw invading sella teratoma of scalp invading cranium and inspissated abscess of parietal cortex of each one case the two last calcified)

Of the 15 tumors 6 were calcified This is 40 per cent as against Heuer and Dandy's 6 per cent Even if we take the

percentage on a basis of all the possible tumors in the series including idiopathic epilepsy we get over 8 per cent calcified Three of them (20 per cent) were calcified gliomata Clarke's observation of the frequency of hemorrhage confined to the tumor in gliomata may be of importance in explaining this One case of cystic glioma in the left prerolandic region showed calcification in the right occipital lobe

In our series were a number of other calcifications within the calvarium

2 cases calcification in subdural hematoma
1 case calcification in ventricular hematoma
4 cases calcification in falx
1 case calcification in parietal dura
1 case calcification in pituitary (clinically non tumor)
2 cases calcification in cerebrum lesion unknown
94 cases calcification in pineal

The above are unverified roentgenologic diagnoses There were also proved one case of teratoma of scalp in the occipital region intruding into the cranial cavity and one case of inspissated cortical abscess

Pineal Calcifications —The frequency of pineal calcifications (over 41 per cent) is noteworthy especially when compared with Heuer and Dandy's incidence of 17 per cent I attribute this entirely to recent improvement in x ray technic Forty five per cent of adults (over fifteen years) in our series showed calcified pineals The earliest appearance was in a mentally deficient girl thirteen years old in whom it was moderately dense and measured 5 × 5 mm The largest pineal seen was in a man sixty-one years old and measured 7 × 15 mm

Case Reports —Case No 7571 Mrs L L forty five years old housewife entered January 31 1922 complaining of nervous breakdown beginning a year before with failing vision for eight months and drooping of left upper lid for four months She had ceased menstruation at the age of twenty five For twenty years she had suffered weekly attacks of vomiting with hitemporal headache which however had grown rather less severe later

Examination showed drooping left lid and paralysis of left external rectus Right eye showed vision 15/10 with slight defect in lower temporal field Left eye visions fingers at 1 meter with large defect in upper temporal field and ophthalmoscopically a marked optic atrophy *x* Ray (Fig 345) showed the sella expanded with eroded floor and dorsum and calcification behind it and above the calcified pineal

The diagnosis was pituitary tumor too large to be operable Under monthly *x* ray she has improved definitely suffering but

Fig 345—Case 7571 Enlarged hypophysis with patches of calcification The sella appears deepened and the dorsum appears eroded Not verified

little headache and vomiting rarely Vision of right eye is now 20/50 left 20/30 but bitemporal hemianopsia is nearly complete Her basal metabolic rate is minus 30 per cent

Case No 7589 Mr A G thirty two years old a laborer entered January 11 1922 for hemiotomy After operation he was seen in an epileptic attack and then a history was elicited of many major and minor attacks during the year past sometimes half a dozen a day He thought the left arm twitched more than the right

Neurologic examination revealed nothing abnormal Vision

was normal with normal eye grounds x Ray (Fig 346) showed a curled ribbon of calcification in the base of the right frontal lobe Subsequent cerebropneumograms showed a normal left lateral ventricle but air would not pass into the right indicating obstruction of a foramen of Monroe

He returned for operation on March 20th The tumor was found and exposed 3 cm under the cortex It proved to be infiltrating and not completely removable There was no attachment to dura under the frontal lobe

Fig 346 —Case 7589 Glioma calcified of right frontal lobe Verified by operation and microscopic section

Microscopic examination of fragments showed glioma partly calcified

The patient went home April 10th in excellent condition but suffered many petit mal and one grand mal attack in spite of luminal therapy Since changing to bromid November 1st his attacks have ceased and he feels in good health

Case No 8221 Mr C C twenty nine years old a long shoreman entered March 16 1922 complaining of violent head aches for a month with occasional precipitate vomiting without nausea The vomiting was preceded by hallucinations of smell (odor of burning hair) For a much longer period—about

three years—he had suffered a grand mal attack about every three months There had been diplopia for one month

Examination showed bilateral choked disks 4 D with fair vision No localizing nerve signs *x* Ray (Fig 347) showed extensive calcifications in right frontal region and much increase in convolutional markings

March 20th right temporal craniotomy was done Tumor was found at a depth of ½ cm under the frontal cortex and a small piece removed for microscopic examination which showed infiltrating glioma The tumor felt bony under the knife

Fig 347—Case 8221 Glioma of right frontal lobe Visual field by perimeter and microscopic projection Increase in convolutional markings

It was intended to attempt removal at a second operation but the patient has done so well under monthly *x* ray treatment that this has been abandoned His vision soon returned to normal and he has been driving a truck since July 1922 and feels perfectly well

Case No 8522 Mrs M M twenty nine years old housewife entered April 3 1922 complaining of severe headaches for two years with gradual loss of vision and transient amblyopia There had been occasional projectile vomiting

Neurologic examination was practically negative except for almost complete blindness and bilateral choked disks of 2 D x Ray (Fig 348) showed crescent of density in left middle fossa and increase in convolutional markings

Left subtemporal decompression was done April 15th Ventricular needle met resistance at 3 5 cm depth Directed further back it tapped the temporal horn

Fig 348 —Case 8522 Large tumor in left middle fossa containing a crescent of calcification Tumor verified at operation but no microscopic examination obtained Some increase in convolutional markings Destruction of dorsum sellæ, and posterior clinoids.

Nothing is known of patient since he went home on April 24th

Case No 8932 N J a little girl born October 1916 began at the age of three to have spells of abstraction in the morning with rigidity and trembling of the right arm In January 1921 spinal fluid was found normal but roentgenograms showed calcification in left parietal region Eye-grounds appeared normal Operation was advised but with surgeon s consent was put off A month later neurologic examination showed bilateral Babinski and weak knee-jerks but otherwise a normal child

By May 1922 the attacks of focal epilepsy had become daily events with initial cry and twitching of whole right side but without loss of consciousness Neurologic examination by Dr

W F Schaller showed practically nothing x Ray (Fig 349) showed extensive calcification in left parietal region

On May 3 1922 craniotomy was done by Dr P K Gilman (who has kindly permitted me to publish this case) and an extensive tumor was found partly cystic and not separable from surrounding brain substance Dr Gilman considered it not removable but took a tiny piece for microscopic examination which showed infiltration of brain tissue by tissue containing abundant fibrils probably a glioma definitely not an endothelioma

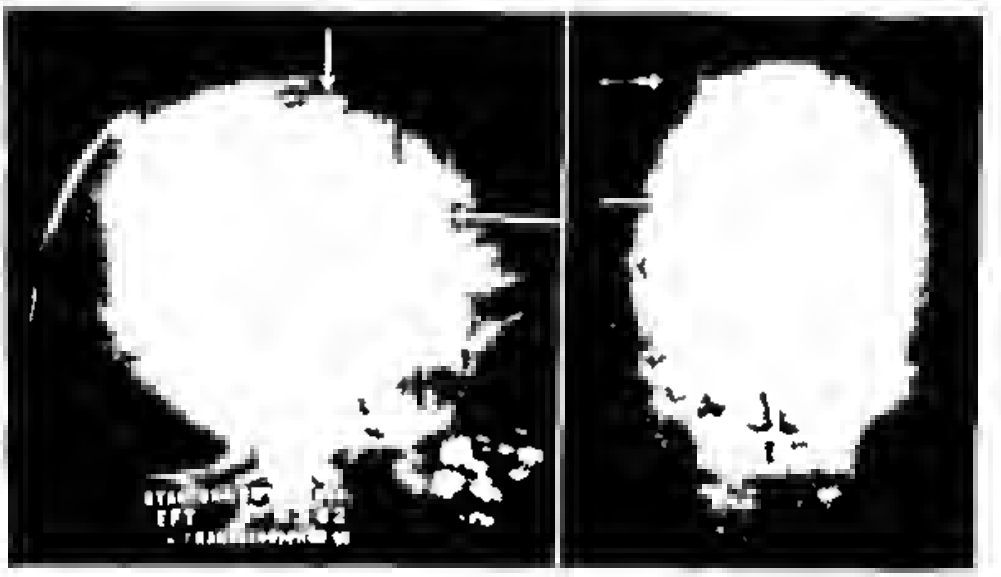


Fig 349—C 8937 Gl m at fi d l ft p t l gi V fi d by pe t d m p t Th g f cal m th t m

Recovery was uneventful and she had only one attack before leaving for her home in the country May 17 1922 where x ray treatment begun here has been continued

Case No 9883 W W a schoolboy ten years old entered July 3 1922 Vision had become poor one and a half years before and later headache and attacks of vomiting had come on

Examination showed left sided hemiparesis and bilateral choked disks (5 D right and 7 D on left) x Ray (Fig 350)

showed some wavy calcification above and to the left of the sella and increase of convolutional markings

Right subtemporal decompression July 7th relieved headache

Left subtemporal decompression was done July 21st By July 31st disks had receded to about 4 D and two weeks later x ray treatment was begun By August 18th the disks were flat and there was optic atrophy The patient s condition grew

Fig 350—Case 9883 Tumor above sella partly calcified with destruction of dorsum sellæ and marked increase in convolutional markings Not verified

gradually worse however and his parents insisted on taking him home to the country

Two other cases deserve brief reports

Case No 8863 C B a schoolboy fifteen years old entered April 24 1923 He had suffered epileptic attacks focal in right face for a year

Examination showed weakness of right side of face Mc Ewen s sign was positive 4 cm above left auricle x Ray (Fig 351) revealed a very small very dense spot just inside the calvarium in the left parietal region

The left motor cortex was exposed and the tumor could be felt just beneath it It was easily removed and proved to be 1

cm in diameter and 1 5 cm long The patient died three hours later possibly from loss of blood Necropsy was not obtained

Microscopic examination showed an inspissated abscess with dense fibrous wall Roehl s stain showed no deposition of cal cium salts

Comment The calcified spot in the roentgenogram corresponds exactly with the location of the abscess removed Such ab cesses are frequently multiple and there may have been cal cification in a near neighboring one More likely is it however that the calcium in the abscess was soluble so missed by the

F g 351 —Case 8863 Calcificat in sp ssated abscess of left motor cortex. V rifi d by operat a d micro cop c ect n except that o calci m wa demonstrated by ta ning method

stain As Heuer and Dandy have pointed out x ray sees the atom and is independent of chemical combination

Case 11 648 Mr R L W a patient of Dr T G Inman who has kindly let me report the ca e showed in the roent genogram (Fig 352) a pot of calcification above and behind a calcified pineal and several centimeters to the right of the mid line His neurologic igns however were accurately localizing and at operation Dr E B Towne found a cystic glioma of the left prerolandic area

Comment This calcification remains unexplained The serious thing about it is that it would have been misleading if the neurologic signs had not been clear It is a forcible reminder that roentgenograms must be interpreted in correlation with the clinical findings

I wish to thank Dr E B Towne who operated 6 of the cases here reported and Dr P K Gilman who operated the other 2 for their interest and assistance in this compilation

Fig 352 —Case 11 648 Calcification in right occipital lobe in a patient in whom a large cystic glioma was found in the left frontal lobe

Conclusions —1 The importance of visibility in the roentgenogram due to calcification has been underestimated as a diagnostic and localizing sign in brain tumor

2 Modern advances in x ray technic have resulted in an important increase in the number of calcifications shown

3 Gliomata are not infrequently calcified Three proved cases are reported here

4 About half of the adult population has calcification in the pineal gland

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CLINIC OF DR WALLACE BRUCE SMITH

University of California Hospital

NOTES ON THE PRACTICE OF PERORAL ENDOSCOPY

The progress of peroral endoscopy a new field of medicine has been one almost wholly of dissemination during the last decade Killian removed the first foreign body from the trachea in 1897 Its practice at first was confined to a few who were located in areas of large population With increasing frequency one notices reports of cases in domestic and foreign journals coming from small cities and towns not known beyond their own neighborhood This means that the technical difficulties are being overcome by an ever enlarging number of as a rule young men who are successfully practising this procedure in the communities in which they settle and start their life work

On account of the indications for this procedure those specialists living in small communities cannot hope to have large numbers of cases to report or perhaps to acquire the skill of those living in the congested populated areas nevertheless on their shoulders (the ordinary specialist) must fall an ever increasing number of patients who look to them for relief and to those who see relatively few cases or to those who are in their early years of experience there must occur points of similarity in dealing with fundamental difficulties of the operation and it is from that standpoint the following observations are discussed

The organization of the operating room is an essential the importance of which is occasionally realized to the detriment of the patient Even the most trivial details must be carried in the mind of the operator so they can be given to the head operating room nurse with each operation This is especially true in teaching hospitals where the personnel of the operating

room frequently changes At times each case is new to the majority of the nurses in the operating room

Anesthetics —In children the struggling which makes introduction difficult can be overcome by giving the child sufficient ether to get him completely relaxed whereupon the introduction is easily made and it is not usually necessary to continue the anesthetic The child being well wrapped foreign bodies can be discovered and removed or cicatricial stricture of the esophagus passed with bougie before the child gets out from the anesthetic It is hard to conceive of a child who has not experienced an operative procedure to be quietly on the table and allow one to introduce the bronchoscope into his trachea or esophagus without protest

Grown people who are not nervous present an easier question A hypodermic of ¼ grain of morphin and 1/200 grain of scopolamin given one and one half hours before operation and repeated one hour later and patient taken to operating room thirty minutes after the second hypodermic is of great benefit in which case very little cocain will be necessary even for an introduction into the trachea and usually no anesthetic will be required when going into the esophagus

Approach —A great deal has been written and a great many illustrations made of the proper position of the patient for introducing the bronchoscope There is one fundamental however above all others which must be observed if one is to introduce the instrument with facility and ease When it is realized that the trachea and the esophagus do not enter the thorax in a straight line with the mouth but that the instrument must enter in a straight line and that it is possible by the position of the patient to acquire a straight line from the upper teeth to the esophagus or into the trachea a great obstacle is overcome The patient's body must be bent forward on to the thighs the shoulders thrown forward on to his chest giving him the appearance of a moderate humpback and the head extended on the neck without changing the position of the body The patient will now be in the right position It is of small moment whether the patient is lying on his back or left side or sitting in the chair

The primary position of the body as described above will make the introduction easy and possible in any of the three positions mentioned As a matter of fact it is almost impossible to introduce the instrument without first acquiring this position

Once in the trachea or esophagus the main indication is to discover the indicating lesion whether it be foreign body or new growth As a rule this is very easy with foreign bodies save perhaps locating a pin with the point up Difficulties are encountered especially in such case where the object is located on the left side where the cardiatory movement interferes with the fixing of the vision, and again in cases of foreign bodies located in the middle lobe of the right lung

The grasping forceps that come with any bronchoscope set will prove satisfactory with most foreign bodies If there is a fault in grasping the foreign body it is more apt to be either the incorrect position of the patient or the lack of skill on the part of the operator than the instrument

In some cases recourse to a hook will be found expedient as for instance the larger end and attached stem of a rusty collar button—a button such as is sometimes used in laundries to close the front of the collar band This object was in the right lower lobe secondary bronchial tube big or flat end up and completely filling the lumen of the bronchial tube It appeared to be an impossible maneuver to get the jaws of a grasping forceps over the big ended bottom without injuring the mucous membrane so a hook was used and easily passed beyond the foreign body turned 45 degrees and the button fetched into the lumen of the instrument and so removed In another case the half of a parched peanut which also filled the lumen of a secondary bronchus recourse was had to the hook for fear of injuring the mucous membrane and of perhaps crushing the peanut thereby giving us many instead of a single foreign body The result was quite as satisfactory as in the case of the collar button It is always advisable after the foreign body is located to note its position and discover the narrower as against the wider measurement of its presenting part so that the jaws of the forceps can be adjusted before being introduced If the forceps are o

constructed as not to permit of this the operator compensates for it by the position in which he holds his arm this is best exemplified *in cases of coins and buttons leaves peanut hulls* etc

Complications —To know the complications which may arise from a pathologic condition or a surgical procedure and to avoid them successfully when possible or treat them when they have established themselves is as essential as the knowledge of the pathologic condition itself or the necessary skill to carry on the surgical procedure

When the peroral endoscopy has to do with the respiratory tract we have mostly to do with complications arising from mechanical causes and this is confined mainly to swelling of the soft subglottic tissue producing temporary obstruction to respiration which can readily become dangerous to life This complication occurs more frequently in children and babies On the part of the operator either unskilled introduction of the bronchoscope a tube relatively large or too frequent introduction at one seance or keeping the tube in the trachea for too long a period are causes which produce this distressing state of affairs—for such it really is indeed

On the part of the patient we may have inflammation extending down from the larynx and up from below such as an intercurrent laryngitis or tracheitis bronchitis as caused by colds etc or the foreign body itself in foreign body cases can have traumatized the subglottic area either in its passage to lower regions or by its having lodged in the neighborhood However in cases where there was no definite notice made of a pathologic subglottic swelling at the time of introduction it must be considered as due to the instrumentation and it must be remembered that there is no field of surgery where dexterity and skill are so potent for good and where the opposite contains the possibilities of so much harm

In a series of foreign body cases covering the writer's experience of ten years this complication has occurred twice The first was the case of a three year old girl who had aspirated a small blue headed beauty pin while playing in the yard with her

sister April 17 1917 She was seen in the hospital eleven days later Pin was located on the left side econdary bronchial bifurcation lower lobe sharp end up Pin was considerably influenced by the cardiac motion so that it was difficult to discover its sharp upper end The tube was in thirty minutes altogether Two days later patient s breathing was difficult a direct laryngoscopy was done condition diagnosed and a tracheotomy performed Patient left the hospital ten days later tracheotomy tube having been out two days This com plication can be accounted for in the length of the time of instru mentation

The second that of a nine months baby who had aspirated a piece of dead leaf on the margins of which were small sharp spines like a holly leaf It had remained in the trachea for twenty four days and the child s general health condition was run down It was easily seen and removed duration of instru mentation not over six minutes with a tube which was easily introduced Seven hours later respiration became labored and when seen thirty minutes later was in a critical condition A vomiting spell choked the air off altogether and an emergency tracheotomy was performed in the ward patient cyanosed and limp As soon as the trachea was opened the stormy symptoms disappeared and the little one left the hospital ten days later cannula out wound almost closed and general condition approaching normal She was seen a couple of months after ward fully recovered

The first case can be accounted for in that the instrumenta tion lasted thirty minutes It is hard to concede in your own case that a six minute instrumentation in a nine months child should be sufficient to produce subglottic swelling The case was an easy one presenting no difficulties

When the peroral endoscopy has to do with the esophagus the arising complications are those of infection from previous traumatisms either from the lesion that necessitates the exami nation foreign body or from the instrumentation

One would like to doubt that there were even an occasional endoscopist who could be so ungentle or unskilled as to injure

the esophagus There has been enough written and it has been written with sufficient frequency and the information has been made so acces ible for there to be no excuse for ignorance of the delicateness of the esophagus and the serious consequences following injury Surgically more intolerant than the brain is the expression used by the foremost practical endoscopist in the short history of this field of medicine Withal however there still are many sad results from forays of overenthusiasts into this viscus More often than his own errors the endoscopist is brought in to witness the havoc wrought by the family phys ician or sur_geon who blindly tries to remove foreign bodies with proban_gs or forceps—usually a long uterine forceps—or who try to dilate a friable carcinomatous stricture with a bougie or stomach tube An illustrative case will make the point clear

A lumberjack was brought into the University of California Hospital Thur day August 11 1921 who had gotten choked on the wishbone of a frying sized chicken the Sunday before He consulted a physician the day following the choking who made repeated attempts with a probang either to pull out or push down the chicken bone On admission to the hospital he was in a bad state—pulse 122 respiration 35 and temperature 104 F with a peculiar sweetish foul odor to his breath great pain and prostration emphysema around lower part of neck in front and upper part of thorax The expression on his face and the whole manner of him was of one *in extremis* The Roentgen ray was negative With the expectancy of exitus at any moment the patient was put on the operating table the bone found 25 cm from the upper teeth and removed The keeled end had cut throu_gh the esophagus and trachea a little to the right of anterior the shorter of the separated ends was free in the esopha gus the longer had penetrated through the esophagus into the peri-esophageal mediastinal tissues and on both ends firmly attached were some half dozen bristles of the probang

It is improbable that the force exerted by the esophagus on anything it may temporarily contain is sufficient to drive a bone of the size of the one in question through its own wall and the wall of the trachea on the one hand and through its own wall

and into the mediastinum on the other That it ultimately does occur through traumatism infections and ulceration there can be no doubt but not in four days

The patient died five hours after leaving the surgery Would the patient have died had there been no blind attempts at removal?

The future of peroral endoscopy must carry some similarity to historically earlier difficult surgical procedure as the process of dissemination mentioned above would already seem to indicate The number of those qualifying as endoscopists will multiply many fold the procedure will become better known perhaps simplified and its benefits taken advantage of by internists and surgeons Blind groping in the esophagus for foreign bodies by surgeons or the equally unscientific attempts to dilate carcinomatous structures by internists has already let us hope at least disappeared from the medical faculties of the teaching institutions and will soon be regarded by all medical men of training as a condemned procedure relegated to a past generation

CLINIC OF DR ALFRED BAKER SPALDING

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RUPTURE OF THE UTERUS AFTER OPERATION FOR UTERINE SUSPENSION

SUSPENSION of the uterus during the child bearing age is so frequently performed that an experience of rupture of the uterus in labor following such an operation is deemed worthy of report

On July 10 1921 I was called to see a patient at 11 30 P M who had been under an anesthetic for one and a half hours because her attending physician had been unable to deliver her by attempted forceps and attempted version and extraction The labor had started at 6 P M on July 9th The membranes had ruptured at 9 A M on July 10th At 9 P M the attending physician stated that he could not feel the cervix by vaginal examination so called his brother in consultation The second physician found the cervix high above the promontory of the sacrum He pulled this down and finding the cervix dilated attempted to apply forceps He could apply only one forcep however because of the difficulty of introduction He then attempted version which was unsuccessful The result of the attempted version caused the cord and arm to prolapse into the vagina

On examination at 11 30 P M I found the cord prolapsed and pulseless with the right arm presenting into the vagina The promontory of the sacrum was projected forward The child was lying in occiput left position The presenting part lay in a cap formed by the anterior wall of the uterus The posterior wall was indefinite Some thick tissue seemed to be interposed between the baby s leg and head There was no fetal heart heard The patient s pulse was 130 temperature

normal She was flowing rather freely of bright red blood It was judged impossible to deliver the patient by the vagina and the patient was sent to the operating room for laparotomy

On opening the abdomen I found about a cup of free blood in the abdominal cavity The anterior wall of the uterus was adherent to the lower part of an old abdominal scar by a band as thick as the forefinger This band was severed and a large amount of adhesions in the neighborhood of the right adnexa

F g 353 —Sh w g kolpo he w th p l p e f ght m a d d

were separated from the anterior abdominal wall The uterus was found to be ruptured posteriorly at the vaginal junction so that the baby s arm and cord which had been felt by vaginal examination projected into the abdominal cavity (Fig 353) The round ligaments were clamped with difficulty and the bladder separated from the front of the uterus The right broad ligament was clamped below the adnexa because of damage due to the adhesions The left adnexae were left in the abdomen

and the uterus was amputated at the site of rupture, without opening as the baby was dead The vagina was closed and the round ligaments with the ovarian stumps were sutured to the cut edge of the vagina This area was covered with the peritoneal reflection of the bladder The abdomen was closed in layers The patient left the table in good condition having been under the anesthetic for several hours that is from the time the attending physician had first attempted to apply forceps

The patient made an uneventful recovery the pulse dropping from 130 to 90 by 4 o clock on the day of operation The highest temperature during her convalescence was 100 4° F registered the first day postpartum The patient left the hospital in good condition on July 20th with a pulse of 96 a temperature of 98° F and respiration of 16

The following history was obtained from her attending physician

The patient was twenty six years of age gravida III para II Her last baby was born in May 1918 by forceps delivery She was operated on in May 1920 when some form of uterine suspension was done There was evidently no intention to do a fixation but the operation had been followed by a peritonitis as the uterus was firmly adherent to the abdominal wall along the line of incision and the right side of the abdomen Her last period was September 25 1920 which made the labor due according to Nagel s rule about July 2 1921 Throughout pregnancy there had been considerable nausea and some abdominal pain otherwise her condition was normal Her pelvic measurements were normal

The above case report serves to illustrate the bad prognosis for pregnancy following fixation of the uterus to the abdominal wall The literature on this subject is very extensive and so often has this fact been mentioned that it is hardly conceivable that one would now intentionally fix the uterus to the abdominal wall for a woman during the child bearing period On the other hand the great frequency with which the operation is performed and the great variety of technic advised seems to point to the fact that altogether too frequently the uterus becomes unintent

tionally fixed in operations designed merely for the purpose of suspension

The uterus is found to be retroverted in about one fourth of all patients examined and seems to be rather more frequent with young women than with women near the menopause in spite of the fact that parturition increases the number of retroversions Many of these retroversions produce no symptoms until the time the patient becomes pregnant Then there is undoubtedly an increased danger that the patient may miscarry about the third month from failure of the uterus to spontaneously replace itself In my experience it is seldom the sole cause for sterility and replacing the uterus with the idea that pregnancy will follow is frequently disappointing

In the class of young patients who suffer with pelvic inflammatory disease the incidence of retroversion of the uterus is markedly increased For instance following the examination of 500 girls in the Ventura Reform School in California the resident physician reported that 75 per cent showed pelvic inflammatory disease and 50 per cent retroversion of the uterus With these patients undoubtedly the symptoms complained of were due more to the inflammatory condition than to the mechanical displacement

From an examination of 300 consecutive confinements in Lane Hospital we found an incidence of 44 per cent of retroversion of the uterus which gives an increase over the precentage found in non pregnant patients In my private practice many patients with postpartum retroversions have been permanently cured not only of an acquired retroversion but of a congenital retroversion by the proper and persistent use of a well fitting pessary postpartum And frequently the patient so treated has been found after a second confinement with the uterus in normal position

Where vascular changes have taken place so as to produce pelvic varicocele we have found that a Gilliam uterine suspension gives the best chance for permanent relief of symptoms particularly if the sacro uterine ligaments are shortened at the same time

These facts have caused me practically to limit the indications for replacing the uncomplicated retroversion of the uterus by operative means to those patients who suffer with the symptoms refereable to varicose veins in the broad ligaments That these ideas do not meet with the practice of the profession in general is illustrated by the fact that in one month out of 631 gynecologic operations posted by the Academy of Medicine[1] in New York City 133 or 21 per cent of the operations were for retrodisplacements or prolapse of the uterus

In 1919 Emge[2] reported our clinic experience with 33 full time labors following various types of uterine suspension and fixation Of 11 operations performed in the clinic 5 by Webster technic 3 by Gilliam 1 by Kelly Neel and 2 by Coffey technic there were 11 spontaneous labors although one was rather long and severe Since then we have 14 labors after suspension to report which have resulted in 12 spontaneous labors 1 cesarean section and 1 high forceps Therefore out of a total of 25 labors following uterine suspension without fixation there were 23 perfectly normal labors This probably fairly represents the experience following such a suspension of the uterus as is recommended by Olshausen or Gilliam or some of the many modifications of this operation

Contrasted to this is clinic and consultation experience with 44 labors following operations for uterine suspension where the type of operation was unknown In this group there were 29 spontaneous labors including 1 case of breech extraction and 1 of low forceps operation There were 3 cesarean sections one hysterectomy for rupture of the uterus (reported above) 7 high forceps 3 versions and 1 craniotomy In other words serious dystocia has occurred in over 34 per cent of these patients previously operated upon for retroversion of the uterus

With this group of patients there was also an increase in the fetal mortality due to operative interference and one mother died two weeks after cesarean section from an infected hematoma of the right broad ligament Several patients suffered at the time of labor from various forms of hemorrhage including separation of the placenta and placenta previa However the

most serious complication met with was the case of rupture of the uterus reported above

In conclusion it is interesting to note the statistics of Weber[3] who called attention to the fact that in the Munchner Frauen klinik the percentage of uterine ruptures had increased from 1 in 1476 labors previous to 1899 to 1 in 697 labors since 1899 He attributes this increase in the number of ruptures to injuries to the uterus caused by previous operations particularly to injuries caused by curettage in the puerperal period Of 28 ruptures during this operative period one was through an old cesarean section scar Fixation of the uterus to the abdominal wall is an additional factor that predisposes to rupture of the uterus following operation upon women during the child bearing period

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CLINIC OF DRS W W BOARDMAN AND P K GILMAN

FROM THE MEDICAL AND SURGICAL CLINICS STANFORD UNIVERSITY MEDICAL SCHOOL

CHRONIC CHOLECYSTITIS SIMULATING GASTRIC MALIGNANCY

IN the great majority of cases with our present means of diagnosis it is possible to be reasonably certain of recognizing organic disease of the stomach and duodenum and to differentiate it from chronic gall bladder disease However we have recently had 2 cases and through the courtesy of Dr Stanley Stillman can report a third in which the above does not hold true These cases judging from a casual survey of the literature including George and Leonard's The Pathological Gall bladder appear to be unusual in that definite radiographic evidence of an organic defect of the stomach was demonstrated (Figs 354 355) which at operation proved to be caused by pressure of an enlarged gall bladder and surrounding adhesions

CASE REPORTS

Case I —Mr C G (No 100 185) American aged fifty three years Elevator operator Married

Complaint —Loss of appetite stomach distress after meals belching loss of weight and weakness Duration fifteen months

Family History —Unimportant

Past History —General health very good Acute infectious diseases severe diphtheria 1920 Operations tonsillectomy August 1921 under general anesthesia

Head and Neck —Negative except for chronic tonsillitis and several abscessed teeth recently removed

Chest —Negative

Gastro intestinal —Appetite always good and patient a large

eater up until present trouble Absolutely denies previous gastric distress belching and regurgitation Bowels regular

Urinary and Venereal—Negative

Skin—Negative

Nervous System—Negative

Fig 354—C F G h w g l g d f ct f the pyl c t m f d t per t to b d t e l ged gall bl dd a d adh n nd n t t ca m

Habits—No excess Tobacco none Alcohol moderate Works hard and sleeps well Average weight 150 pounds

Present Illness—Patient dates the onset of his present illness about two years before admission It began by the regurgitation of rather large and increasing quantities of clear sour fluid a short time after each meal This was preceded by distres in

the upper abdomen belching and distention all of which symptoms were temporarily relieved by the bringing up of this fluid

These symptoms persisted and later were accompanied by loss of appetite weakness, and a rather marked loss of weight

Four months before patient s admission his chronically inflamed tonsils were removed on the theory that they might be

F g 355 —J C showing irregularity of pyloric zone and large defect of antrum found at operation to be due to adhes ons and not to carcinoma

the cause of his weakness digestive disturbances and loss of weight However following this procedure the patient s symptoms were aggravated rather than relieved It then be came necessary for the patient to restrict his diet eliminating certain articles of food and limiting others especially meat Still later any but a moderate amount of food increased his distress Recently patient has been constipated and suffering from hemorrhoids

One week prior to his admission to the hospital the patient was examined by one of us the examination being negative except for general appearance evident loss of weight and weakness *x* Ray examination on this occasion showed on repeated examination a persistent widening of the pyloric interspace somewhat more marked on the lesser curvature with about one quarter residue at six hours A test meal revealed subacidity without occult blood As a result of these findings patient was advised to enter the Medical Clinic of Stanford University Medical School for further study and probable operation for pyloric carcinoma

Re-examination in the hospital disclosed the following

Head and Neck—Negative

Chest Heart and Lungs—Negative Blood pressure 140/80

Abdomen—At this time a fulness was distinctly seen in the upper half of the right upper quadrant This area was dull to percussion and on palpation a nodular mass 5 to 6 cm in size was felt extending downward to within two fingerbreadths of the umbilicus and to the left as far as the midline This mass moved with respiration was not attached to the abdominal wall and could be grasped with the examining fingers The liver edge was made out just below the right costal margin There was no muscle spasm but some tenderness over the mass There was no tenderness in the region of the appendix Rectal examination was negative

Extremities—All reflexes were present and equal

Laboratory Examinations—Urine Negative

Blood—Red cells 5 800 000 with but 75 per cent hemoglobin White cells 6900 leukocytes 62 per cent lymphocytes 34 per cent and 4 per cent transitionals Wassermann negative with all antigens

Gastric Analysis—Fasting content total acidity 7 per cent no free hydrochloric acid Fractional meal clear straw-colored fluid one half hour total acidity 7 per cent no free HCl one hour same one and one half hours total 10 per cent no free HCl Microscopic examination was positive for Oppler Boas bacilli No occult blood

x Ray Examination—Stanford University Hospital *x* ray Department

Name Mr C G Medical Clinic Medical Ward November 9 1921

Region Gastro intestinal

The capacity of the stomach is diminished so that it is distended in appearance by less than the usual 14 ounces of barium mixture The stomach is held very high up in the abdomen beyond the reach of palpation save in the region of a palpable mass which corresponds with a large filling defect of the antrum Beyond the filling defect a small piece of antrum is seen bounded on one side by the defect and on the other by the pylorus The duodenum appears normal

At six hours there is marked hypermotility the head of the barium column having reached the splenic flexure with ileum almost empty

The patient did not return for the twenty four hour observation

Conclusion *x* Ray evidence of a large tumor mass of the gastric antrum

In view of the above findings by the hospital staff the patient was referred for operation with the independent diagnosis of carcinoma of the stomach

Operation November 10 1921

The abdomen was entered through a midline incision between the ensiform and umbilicus

On exploring the viscera the pylorus was found thickened and looked edematous but no thickening suggesting carcinoma was found the walls of the stomach and duodenum being otherwise apparently normal

The gall bladder was next inspected and found to be enlarged to about 7 cm in diameter and 12 cm long Its walls were thickened opaque and under considerable tension suggesting a fairly recent acute distention In the region of the gall bladder and cystic duct the wall of the viscus was considerably more thickened and surrounded by numerous adhesions to the omentum The regional glands were enlarged The gall bladder was removed

The appendix was found to be diseased and was also removed

With the definite widening of the pyloric interspace noted in the radiographic examination of November 2d in mind and with the thickening and edema found in the region of the pylorus exploration of the inner surface was decided upon An incision 3 cm long was made in the stomach wall near the pylorus the latter being everted and inspected through this opening In appearance the mucosa was normal and the opening was closed

The postoperative course was uneventful barring a bronchopneumonia The patient left the hospital four weeks after operation in good condition free from his previous gastrointestinal symptoms

Since leaving the hospital his condition has steadily improved until at present he has entirely regained his weight and strength and suffers from no digestive disturbance

Radiographic examination done February 20 1923 more than fifteen months after operation showed some persistence in the original defect due to adhesions as with pressure the defect could be filled out and normal appearing rugæ traced entirely across this area

Comments—The findings a week before patient entered the hospital of persistent widening of the pyloric interspace with delay in emptying of the stomach and subacidity led to a diagnosis of carcinoma of the pylorus The hospital findings of a palpable mass and a large defect of the lesser curvature with anacidity likewise led to a diagnosis of gastric carcinoma by these other observers In spite of the discrepancy of these findings they led to a similar diagnosis In our opinion this discrepancy was at least partially explained by an increase in the size of the gall bladder subsequent to the first examination resulting in the palpable mass and an exaggeration of the gastric defect

Case II—J C (No 104 224) American Aged sixty two years

Complaint—Stomach trouble of eight months duration

Family History —Unimportant

Past History —Unimportant except for herniotomy in 1919

Present Illness —Perfectly well up to July 1921 when shortly after a heavy meal he was taken with sudden severe abdominal pain associated with nausea and vomiting The pain was dull felt throughout the abdomen but was somewhat more marked in the epigastrium This attack persisted for three weeks during which time no food and little liquid was retained

The vomitus consisted of large amounts of greenish fluid Belching was a prominent symptom

Following this attack patient remained quite well until two weeks before admission (March 30 1922) when he was again taken with abdominal distention epigastric pain and vomiting There was no loss of weight

Physical Examination —*Head* —Negative except for marked dental sepsis

Chest —Lungs emphysematous Heart enlarged in transverse diameter Sounds faint and irregular No pulse deficit Blood pressure 110/75

Abdomen —Uniformly distended No masses felt no shifting dulness no tenderness

Extremities —Negative

Laboratory Examinations —Urine negative

Blood Wassermann negative

Stool negative except for occult blood

Test meal fasting content 25 c c greenish fluid with dark green finely divided sediment Total acidity 22 per cent no free HCl Occult blood positive Fractional test meal showed maximum total acidity 11 per cent no free HCl in any specimen

x Ray examination March 3 1922

The stomach is high and tonic and shows fair peristalsis Under the screen it is not seen to empty but the films show a small amount of barium in the duodenum and jejunum The outline of the stomach is smooth There is a defect of the antrum about 3 cm from the pylorus The duodenal cap is never outlined but in one of the films is seen to contain a very small amount of barium At five and a half and seven and a

half hours and again at twenty four hours there was evidence of barium retention in the stomach

Conclusions—Organic lesion of the pylorus with marked delay in emptying

In this case the history does not suggest carcinoma but in view of the patient s age achylia evidence of an organic lesion at the pylorus with twenty four hour delay and the absence of ulcer history exploration for a possible pyloric carcinoma was advised

Operation April 8 1919

The stomach was exposed through a midline incision above the umbilicus and was found so distended a tube had to be passed to empty it

The stomach and duodenum were negative except for a large band of adhesions about the pylorus reaching from the great omentum to the gall bladder The gall bladder was markedly inflamed and surrounded by adhesions The pyloric end of the stomach was pulled up by these adhesions and the duodenum displaced down by the very fibrous and short omentum with a resulting kink in the duodenum and another in the colon The gall bladder was freed from adhesions and removed and the other viscera returned to normal position

The postoperative course was complicated by an auricular fibrillation and terminal pneumonia

Comments—In this case an unexplained pyloric obstruction coupled with patient s age and an achylia raised the question of malignancy requiring exploration to rule it out

Case III—This case is reported through the courtesy of Dr Stanley Stillman Complete records are not available having been destroyed in the fire of 1906 This case was treated previous to the days of *x* ray diagnosis

American male Age fifty five years

Complaint and History—Indigestion and stomach trouble accompanied by pain and vomiting Almost continuous vomiting for a month preceding admission associated with constant pain in the region of the pylorus and rapid loss of weight No

jaundice or any history suggesting gall stone colic Diet restricted to liquids

Examination—Cachexia emaciation

Abdomen—No palpable tumor Stomach lavage showed twelve hours retention This case was regarded as one of carcinoma of the pylorus with obstruction and operation advised

Operation—At operation the pyloric end of the stomach was found to be much thickened and many thick fibrous adhesions were found involving the gall bladder duodenum and pylorus The gall bladder was found to be shriveled to the size of one s thumb and filled completely full of small flat stones not par ticularly faceted There was nothing to suggest carcinoma of the stomach The gall bladder was torn open during the operation and many of the small stones escaped but the wall of the bladder did not bleed nor was there any bile or mucus to be found present it was excised after separating it from the pylorus and duodenum to which it was bound by thick and tough fibrous adhesions Abdomen closed and the wound drained Patient died within forty-eight hours of the opera tion

An autopsy was done at which it was found that the wall of the stomach at the pyloric ring and even the wall of the duodenum contained a number of small flat stones similar to those found in the gall bladder which had traveled between the muscularis and the mucosa of the stomach and of the duo denum and had progressed as much as ¾ inch from the pyloric ring The obstruction of the pylorus was found to be due to edema and cicatricial tissue resulting from the migration of the stones

Comment—In this case as shown at operation and autopsy there was an organic defect of the pyloric antrum and duodenum secondary to inflammation of the gall bladder with stones This deformity would undoubtedly have been demonstrated by *x* ray examination and have presented a difficult problem for diagnosis

Conclusions—1 An enlarged gall bladder and adhesions

may produce a filling defect in the stomach at times indistinguishable from that produced by gastric carcinoma

2 It would appear from the above that no matter how definite and advanced a case of gastric carcinoma appears from the history examination and laboratory findings short of metastases an exploratory operation is indicated

CLINIC OF DR EDWIN I BARTLETT

UNIVERSITY OF CALIFORNIA HOSPITAL

MESENTERIC CYSTS

THE first 2 cases represent rare types of an uncommon tumor Less than 200 instances of mesenteric cysts have been recorded in the literature to date while the records of the University of California Hospital for the past five years yield but 2 cases among 1572 laparotomies

Case I—Cyril C white male schoolboy eleven years old was admitted to the University of California Hospital on June 24 1919 complaining of abdominal distress and loss of appetite The family and past histories were negative except for the usual children s diseases and frequent attacks of sore throat For the last five years he had been a normal healthy boy

The initial indication of the present illness was irritability first noticed about four months previous to his admission About ten weeks later a bilious attack followed the eating of questionable food There was nausea and considerable pallor but no fever or localized pain Quick recovery followed the administration of cathartics and restriction of diet A similar attack except for a fever of 101° F coming on five weeks later or four days before admission and treated in a similar manner seemed to be gradually clearing up when during the night of the third day a sharp aching pain in the right abdomen awakened the patient out of a sound sleep After an hour or two of ineffectual use of the usual home remedies the pain was largely relieved by firm pressure over the right abdomen and the patient again fell asleep In the morning there remained some nausea and a slight dull non radiating aching pain throughout the right abdomen

Examination showed a rather pale well nourished boy about twelve years of age with a tendency to guard his movements and to walk slightly doubled over to the right His temperature was 37 8 C pulse 120 respirations 25 white blood count 10 500 urine negative His general physical examination was negative except for the abdomen which showed uniform distention tenderness over the whole right half especially near the umbilicus board like rigidity of the right rectus and oblique muscles and a suggestion of dulness far out on the right flank Rectal examination was negative Position or effort had no effect on the symptoms

In spite of a low leukocyte count and a normal temperature the sudden flare up of symptoms after a gastro intestinal up set associated with rigidity and tenderness of the right abdomen was interpreted to mean an inflammation of the appendix and the abdomen was explored for the purpose of appendectomy

The peritoneal cavity was opened through a McBurney incision On inserting the finger a mass was discovered filling the whole right flank and pushing the colon well over toward the medial line The appendix was definitely injected but there were no adhesions or exudates though there was considerable more clear fluid in the peritoneal cavity than is usually found The wound was enlarged upward by following the right border of the rectus and lateralward by cutting the muscles Incision was made through the peritoneum at the outer border of the cecum and ascending colon mobilizing the right colon and uncovering a huge black lobulated cystic tumor filling the whole right retroperitoneal space By blunt dissection enucleation was begun but almost immediately one of the larger cysts ruptured and several ounces of straw colored fluid welled up into the wound The wall of the cyst proved to be of paper thinness the inner surface was smooth and shiny and apparently devoid of lining epithelium A trocar was inserted in several directions until drainage was sufficient to decrease the size of the tumor by about one half and then enucleation was completed without further accident The tumor extended from the liver to the brim of the true pelvis and from the point of presentation in

the right flank to the root of the mesentery alongside the vertebral column The main attachment of the tumor proved to be at the under side of the mesentery of the right colon and cecum At this point and again at the junction of the first and second portions of the duodenum sharp dissection with the knife had to be employed in order to separate the tumor from the vessels without injury to these structures No fragments of the tumor were left behind though the cystic cavities at the mesenteric

Fig 356 —Lymphatic cyst Note extreme thinness of walls with gauze packing showing through (Case I)

attachment were extremely small and the capsule of the tumor was very indistinct The lymphatic glands in the overlying mesentery of the colon were markedly enlarged varying in size from ½ to 3 cm They were very pale and were finely bosselated like coarsely pebbled leather The cut surface of one of these glands resembled hyperplasia in the gross and the frozen section showed no primary or secondary tumor The remaining glands were undisturbed The operation was concluded by suturing the rents in the mesenteric peritoneum suturing the posterior

parietal peritoneum and placing a cigarette drain in the retroperitoneal space The patient s condition was sufficiently good to justify appendectomy so the appendix was removed The wound was closed by the usual procedure Patient was under ether about two and a half hours There was no shock

The patient had an uneventful recovery and was discharged on the sixteenth day with a sinus draining a very slight amount

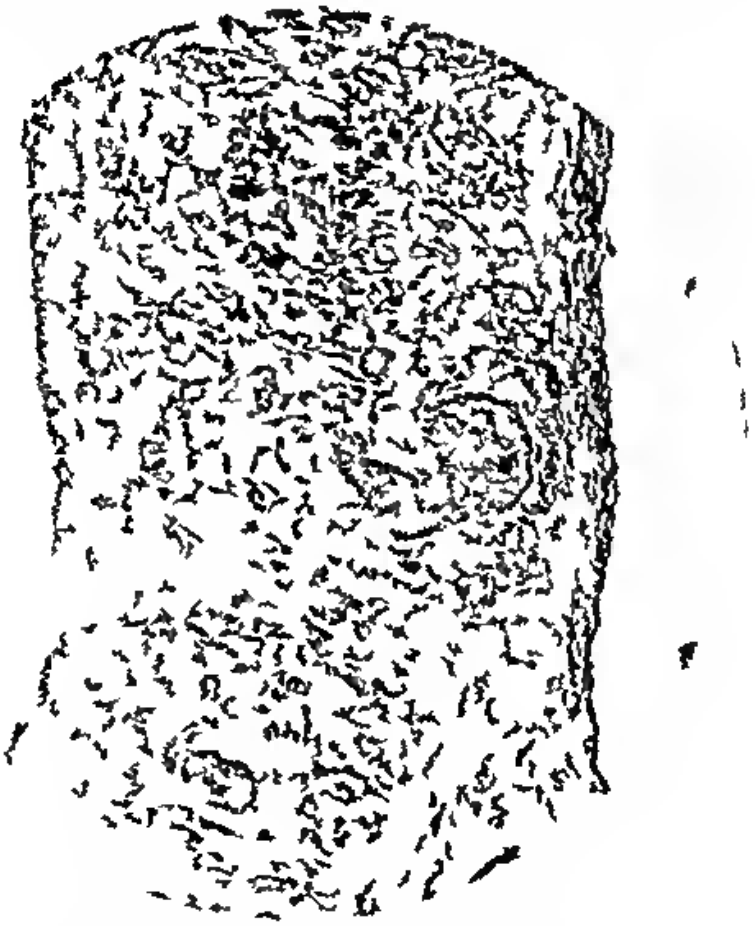


Fig 357 —Wall of lymphatic cyst showing partition between two cavities Note normal outer and inner surface of the wall of blood vessel and round cell infiltration (Cabot)

of clear fluid Healing of the wound was complete by the thirteenth day His immediate postoperative course was complicated by the usual amount of abdominal distress from gas and a very mild degree of nausea His temperature was 40 C on return to the ward but by the sixth day was normal It is now three years since operation and the patient is apparently healthy and normal in every way

The gross specimen (Fig 356) was a multiloculated cyst measuring about 17 cm in greatest diameter The cavities varied from 10 cm across to microscopic, were filled with a serous or slightly blood tinged fluid and lined by a shiny surface The walls were thin edematous and delicate and traversed by numerous large thin walled blood vessels A second specimen consisted of a lymph gland about 1 cm in diameter the cut

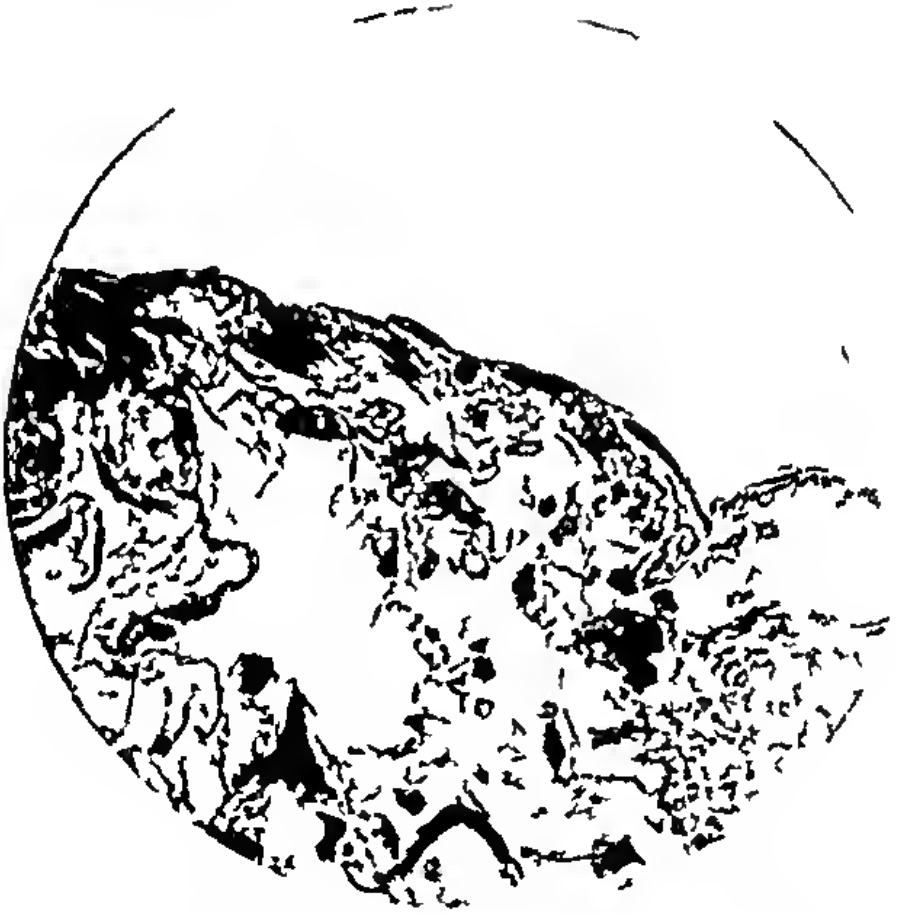


Fig 358.—Lymphatic cyst wall under high power magnification to show endothelial lining (Case 1)

surface of which was glistening succulent and a mottled grayish pink

Microscopically the walls of the cysts (Fig 357) were thin and composed of a cobweb like deeply pink staining connective tissue poor in nuclei and moderately infiltrated with patches of small round cells mixed with infrequent groups of polymorphs Occasionally in the smaller cysts one made out an endothelial

lining but the larger cavities were quite uniformally bare (Fig 358) The blood vessels were numerous rather large and with out walls except for the endothelial lining Differential stains failed to show any smooth muscle Sections from the lymph gland showed an entire disappearance of all the germinal follicles with an enormous dilatation of sinusoids There was no en dothelial hyperplasia

Final Diagnosis—Lymphatic cysts

Case II[1]—Edgar L white married laborer forty four years old was admitted to the University of California Hospital on April 17 1922 complaining of pain in lower abdomen and back His family and past histories were negative except for pruritus ani from which he had suffered for years

The present illness dated back to about September 1 1921 eight months before admission when he first noticed a sense of fulness and uneasiness in the lower abdomen In December 1921 four months later he had cramp like gas pains across the lower abdomen continuing intermittently for about a week and uninfluenced by position food condition of the bowels etc Following this attack the sense of uneasiness and weight in creased but pain was absent till February 1922 six months after the onset when he began having acute sharp stabbing pain starting in the left lower quadrant and traveling across to the right side The patient had never noticed any swelling of the abdomen nor had he noticed anything unusual about his stools until shortly before admission when he recognized blood clots in one stool following a treatment for pruritus ani

Examination showed a well developed well nourished mid dle aged man with negative general physical examination and with normal findings in gastric analysis urine examination kidney function test blood Wassermann reaction and complete blood count The abdomen was slightly protuberant especially in the lower left quadrant where a firm definite slightly mov able non tender tumor mass could be felt Pulsation was made out, but its expansile character could not be agreed upon Ba

[1] Reported through the courtesy of Dr Sam T Pope

rium studies under the fluoroscope were negative for evidence of bowel obstruction Cystoscopic examination revealed no connection between the tumor and the genito urinary system

A positive clinical diagnosis was not attempted in the face of these negative findings so the abdomen was explored under a variety of tentative diagnoses His symptoms were attributed to partial obstruction of the bowel

Incision through the lower left rectus muscle exposed a large bluish black firm rounded non pulsating mass approximately

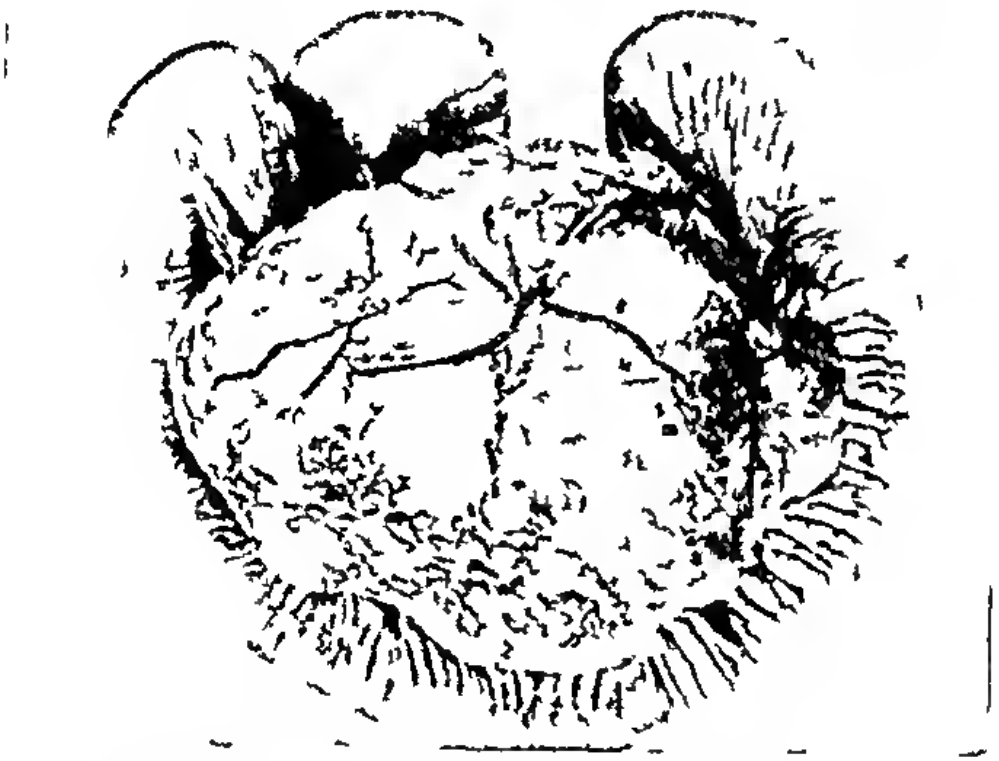


Fig 359 —Hemangeomatous cyst in the mesentery of the ileum Note tough warty surface There is no narrowing of bowel lumen (Case II)

6 inches in diameter situated between the two leaves of the peritoneum in the mesentery of the ileum It lay immediately against the bowel wall for some distance and caused some narrowing of the lumen but no definite or even partial obstruction The boundaries of the tumor were sharp on all sides there were no secondary growths no enlargements of the neighboring lymphatics no peritoneal implantations Resection was performed and followed by anastomosis

The patient s postoperative course was entirely uneventful he was discharged as well on the fifteenth day after operation and is free from symptoms and is in good health today

The gross specimen (Figs 359 360) showed a roughly spheric firm deep purplish red encapsulated mass measuring 100 cm across the outer surface of which was tough and warty much like a toad s back A loop of small bowel partly encircled the

Fig 360—Slide taken from the hemangiomatous cyst showing cavities The fluid escaping from the surface when cut was made gas sample differential blood test a patient s blood from the ear (Case II)

tumor and the mesenteric peritoneum covered two opposite surfaces A slice taken off one side revealed a multitude of cavities ranging from 1 cm across down to microscopic Each was filled with a very dark bloody fluid and was lined by a tough shiny membrane Probing of the cavities demonstrated inter communication or outlet except in the largest

Microscopic section (Fig 361) showed a very definite en

dothelium similar to that in the blood vessels lining all the smaller cavities and a great number of the larger cavities The intervening supporting connective tissue was delicate quite acellular stained a deep pink and was moderately infiltrated with patches of small round cells Differential stain and careful search failed to reveal smooth muscle or other structure than those described

Fig 361 —Low power magnification of smaller cyst cavities and partitions between The lining is continuous endothelium Note patches of round cells (Case II)

Final Diagnosis —Cystic hemangioma

Mesenteric cysts are unilocular or multilocular thin or thick walled sacs filled with a serous sanguineous chylous or mucinous fluid or with a dermoid material and located in the omentum or between the leaves of the mesenteric peritoneum of the small bowel or behind the peritoneum and vessels of the large bowel Cysts of the pancreas or other internal organs malignant tumors

which have become cystic through degeneration and infectious cysts are not properly included under this heading

The origin of such tumors in the majority of instances is from the embryonic anlagen of the primitive sex organ the wolffian body or the omphalomesenteric duct Occasionally they may arise from the abdominal lymphatic cistern or from angiomas of the blood or lymphatic vessels or from dermal inclusions The structure as seen by the microscope varies with the origin High columnar epithelium and pseudomucin suggest the pseudomucinous cyst of the ovary and demonstrate a primitive sex organ ancestry primitive glomeruli in the walls prove an origin in the wolffian body smooth muscle and epithelial lined spaces show a relationship with the intestinal tract en dothelial lining and serous contents in a retroperitoneal cyst point to an origin in the lymphatic cistern or in a lymphangioma With the exceptions of the mucoid secretion of the pseudomucin ous cyst and the blood of a cystic hemangioma the type of fluid is of no significance it having been demonstrated that chylous or bloody fluid results from rupture of lacteal or blood vessels in the cyst walls

The symptoms are invariably those of obstruction though occasionally they seem to point to appendicitis In none of the instances reported was the clinical diagnosis correct and for the most part the true condition was not even suspected The treatment of choice is resection or enucleation though mar supialization has been followed by a cure Recurrence may follow incomplete removal and death may result from obstruc tion but metastasis does not take place and patients do not die of malignant toxemia because these tumors are benign

The first case of our series is lymphatic and arose from the abdominal cistern or developed from some abnormality of the lymphatics of the mesentery to the right colon In support of this contention the microscopic structure is similar to that of the second case except for the scantiness of the endothelial lining and is exactly like that of a huge multiloculated axillary lym phatic cyst removed from another patient The absence of lining cells as a result of pressure is shown in many of the cases

reported and in the axillary cyst just mentioned which could have had no other than a lymphatic origin the larger cavities were all bare That such tumors may arise from the abdominal cistern has been pointed out by Sabin who has demonstrated the origin of similar cyst of the neck in the jugular cisterns

The second case is hemangioma which has become cystic through the shutting off from the general circulation of some of the larger cavities

MIKULICZ S DISEASE

Mikulicz s disease is a painless non sensitive bilateral enlargement of one or more pairs of lacrimal or salivary glands resulting from a replacement of normal salivary gland substance by an overgrowth of lymphoid tissue

Case III —Manuel S white male Portuguese, truck driver thirty one years old was admitted to the University of California Hospital August 16 1920 complaining of swelling of the face He had always been well except for an attack of bilateral mumps complicated by double orchitis at the age of twenty one He recovered satisfactorily from the mumps and for two years was apparently as well as before Eight years before admission his parotid glands again began to enlarge The swelling was painless gradual without remission There were no associated salivary irregularities such as excessive salivation or dry mouth At times when he had a bad cold the glands were tender to touch There was no history in his family of similar trouble

When the patient first visited the clinic there was marked bilateral parotid enlargement about equal on the two sides (Figs 362 363) The surface of each swelling was smooth the edges were fairly sharp the consistency was elastic fairly soft and semifluctuant In contour each enlargement was the shape of normal gland though in actual area covered it was many times larger The overlying skin was freely movable and apparently normal The parotid ducts were huge the walls flabby the openings widely patent Close observation during the use of various sialagogues showed a total absence of secretion The remaining salivary glands and the lacrimal glands were apparently unaffected The general appearance of the patient was that of robust health and the general physical examination was negative There were no lymphatic glandular enlargements

either local or general the spleen was not enlarged the blood count and blood smears were normal the urine examination was negative the von Pirquet tuberculin test was negative both human and bovine The tentative diagnosis was Mikulicz s disease

Exploratory operation was performed August 19 1920 Incision through the skin and subcutaneous tissues exposed a normal appearing gland capsule and division of the capsule and gland substance as far as the posterior surface revealed a succulent grayish white glistening friable tissue not resembling in

Fig 362—Photograph of patient with Mikulicz disease involving the parotid (Case III)

Fig 363—Side view of patient shown in Fig 362 to show limits of swelling (Case III)

any way the parotid gland but rather suggesting an edematous lymph node Throughout were frequent cysts ranging from 1 to 3 mm in size Some of these were spheric most of them were tubular or irregular all were closed sacs without communications with the main ducts or with each other The contents of the cysts were a cloudless and colorless fluid like water A small piece was removed from the depths for microscopic study and the wound was closed without drainage Healing resulted without suppuration

Microscopic studies showed the typical picture of Mikulicz s

disease (Figs 364 365) The salivary gland structures were entirely lacking except for an occasional atrophic duct The gland substance was replaced by small lymphoid cells distributde evenly throughout a barely demonstrable delicate reticulum Here and there were small patches of larger cells in morphology and arrangement resembling somewhat lymph follicle cells

Fig 364 —Higher power of Fig 365 showing nests of larger lymphatic cells (Case III)

The patient was referred to the Radium Department where radium emanation tubes were inserted into the depths of the swelling by means of a hollow needle Six millecuries in five tubes were buried in the right side and 6 millecuries in four tubes in the left side Within a week there was a perceptibe decrease in the size of the glands and by the end of four weeks they were about one-third their original size There was some breaking down of gland substance with liquefaction and at several points

the skin sloughed After eight weeks the face had resumed its original shape and the only evidence of a pathologic condition were the scars of the radium burns (Fig 366) For two and a half years the patient has been free from recurrence with the exception of acute swelling simulating acute parotitis coming on about six months after his first treatment The left gland very suddenly began to swell became painful and tender

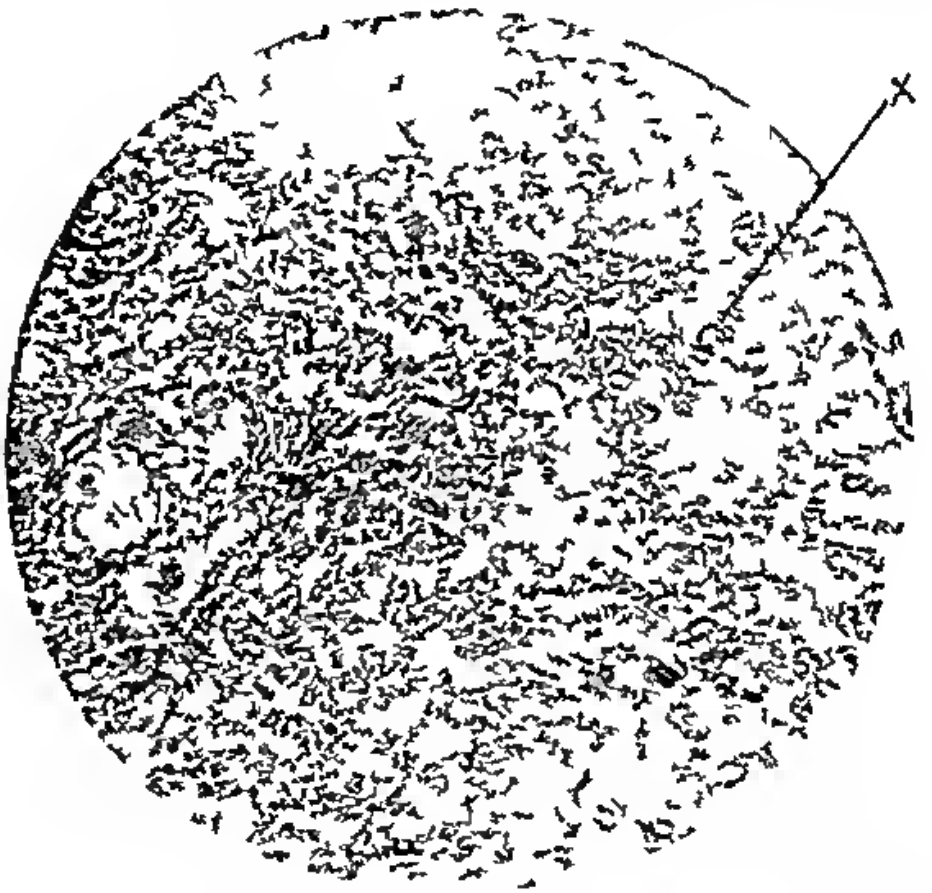


Fig 365—Low power field Multiple adenosis showing the lymphoid stroma replacing the parotid gland parenchyma X Atrophic salivary duct (Case III)

and the skin over the surface became red and edematous Within two hours of the first indication the swelling had reached its maximum size and the pain had become so severe as to prevent sleep In the skin there was one spot redder than the rest and fluctuation at this point was so suggestive that incision was made The gland substance was quite like that observed at the original exploratory no pus was found Treatment with hot

towels was instituted and by the end of forty eight hours the pain had entirely disappeared the tenderness was largely absent and the swelling was practically gone After an interval of about three or four days or approximately one week after the beginning of the swelling on the left side the right gland became swollen Potassium iodid was given in large doses hot towels were applied and the swelling rapidly subsided By the end of the tenth day after the second attack the face had resumed its normal appearance and there was no more tenderness or pain

Fig 366 —Photograph of patient shown in Fig 362 taken two months after radium treatment (Case III)

The first case was reported by Mikulicz in 1888 and several additional instances were reviewed and discussed in his Thesis four years later Since his time a large number of cases have been reported under the name of Mikulicz's disease In 1909 the whole subject was exhaustively reviewed by Campbell Howard who collected from the literature and classified all the cases reported as Mikulicz s disease up to that date Out of the 81 cases which he collected and those that have been subsequently reported about one fourth are authentic or genuine in that the data is sufficient or the conditions described are without complications

Pathology —The original case described by Mikulicz had symmetric and bilateral swellings of the lacrimal parotid submaxillary sublingual palatal and accessory salivary glands A liberal translation of his pathologic findings is as follows The submaxillary glands which were removed *in toto* and which were swollen to the size of a child head conformed exactly to the proportion of the normal glands with regard to lobes and lobules In the coarser macroscopic details the tumor showed the normal structure of the gland only immeasurably enlarged Nevertheless upon making a fresh cross-section a substantial difference in the color and in the finer structure of the gland parenchyma forming the individual lobules was apparent even to the naked eye Instead of the finely granular grayish red structure of the normal gland parenchyma we see a more homogeneous pale reddish yellow bacon like mass of some transparency The number of blood vessels seem to be increased only in septa corresponding to the increase in the size of the organ The substance of the gland itself appears strikingly poor in blood vessels The microscopic examination showed that the main tumor mass consisted of a uniformly arranged tissue of small round cells The cells lie in groups close together or in other places a delicate reticulum can be recognized between Larger isolated cells show plainly many nuclear divisions In these small celled masses there seemed to be embedded sometimes singly sometimes in groups the apparently unchanged acini of the salivary gland They are forced apart to a certain extent by the round celled tissue

The pathology among the cases reported as Mikulicz s disease has often differed from that described by Mikulicz and in these instances the term has been employed as meaning the clinical phenomenon of bilateral salivary or lacrimal swelling Such conditions as leukemia pseudoleukemia tuberculosis syphilis and non specific inflammation in which there has been salivary or lacrimal enlargement have been included Some of these have shown fibrosis inflammation or caseation in the midst of a more or less abundant parenchyma while others that have had more nearly the pathologic picture of Mikulicz s disease

have shown general disease of the same type in the blood or other parts of the body Such cases should not he included among the reports of Mikulicz s disease hut rather should be classed with the constitutional diseases represented

Treatment—The complicated cases have improved under treatment or resulted fatally according to the type of complicating condition and the degree of amenability to treatment of that particular disease With the improvement of the general health in response to hygienic measures tuberculous enlargements have often subsided under administration of antiluetic drugs there has heen complete relief in syphilitic cases in the leukemias and other fatal conditions the tumors have gone down under treatment that has favorably effected the disease proper On the other hand true cases of Mikulicz s disease have neither died of their disease nor shown impairment of general healtb A few bave cleared up spontaneously and some have recovered while under treatment Regarding the latter the actual benefit from the measures employed has heen questioned inasmuch as no therapeutic agent has as yet heen discovered which has yielded a cure in more than one case This unreliability of the regularly employed agents arsenic potassium iodid, x ray etc has prompted experimentation with radium and the gratifying effects from the standpoint of freedom from accompanying local or general disturbance as well as the perfect cosmetic result recommend its future trial

CLINIC OF DR EDMUND BUTLER

San Francisco Hospital

COMPOUND POSTERIOR DISLOCATION OF ELBOW

This twelve year old Russian boy has just arrived in the ambulance The Steward informs us that the boy fell over a cliff and the large bone of the left arm is sticking through the skin and that there has been very little bleeding The Steward cut the coat sleeve covered the wound and protruding bone with a sterile gauze dressing and applied a well padded posterior splint before attempting to transport the patient The boy is not in shock and does not complain of any great amount of pain There is very little bleeding inasmuch as the dressings are not blood stained

Making slight traction on the hand the circular bandage holding the splint is cut and the dressings removed As you see the inferior extremity of the humerus is protruding from a lacerated wound of the anticubital region (Fig 367) The end of the humerus has been stripped of all ligaments and muscular attachments but not of the periosteum The external epicondyle has been sheared off

Our interest is now centered on the condition of the nerves tendons and blood vessels at the elbow joint Sensation is present in all parts of the hand and forearm and there is no paralysis Therefore we know that the ulnar radial and median nerves have not been damaged The hand and fingers are slightly cyanotic but the finger nails blanch with pressure and the temperature is only slightly lower than that of the other hand

In such an injury you would certainly expect the median nerve and the blood vessels to be injured to some extent A palpable pulse in the radial artery is absent If you look closely

Gas and oxygen anesthesia Covering the exposed bone with sterile gauze the skin of the arm and forearm is shaved scrubbed with ether and with alcohol and painted with a 5 per cent alcoholic solution of picric acid We shall now excise the margins of the wound including the skin and fascia and any fringes of fascia or muscle that present

There is no macroscopic contamination of the exposed bone therefore we are going to irrigate the articular surface and adjoining exposed periosteum with a stream of warm sterile normal salt solution for at least ten minutes being careful that the solution does not enter the wound We believe it is far better to get rid of possible infection and microscopic particles of clothing and filth by irrigation than by attempting to render them innocuous with iodin or picric acid solutions or other bactericides which in themselves cause a slight inflammatory reaction in any wound particularly a wound partially lined with synovial membrane

It is our opinion that there has been no contamination of the depths of this wound so there is no reason for attempted sterilization of the deeper portions

With narrow retractors the angles of the wound are retracted and elevated The torn clotted brachial artery is ligated with No 1 plain catgut As we make extension the tendon of the biceps slips around from behind the external condyle and the median nerve slips from behind the internal condyle The dislocation is easily reduced

The belly of the brachialis anticus has been completely torn across near its insertion We will not attempt to suture it as we believe that any instrumentation or manipulation in this wound is likely to introduce infection Scar tissue will fill in between the torn ends and possibly a fairly well functioning brachialis anticus muscle will result

We are going to be satisfied with this simple open reduction and make no attempt to repair the lateral ligaments The head of the radius is held in its proper relation to the ulna by the unruptured orbicular ligament The margins of the wound fall together and no sutures are necessary

We put this elbow in a compress of normal salt solution being careful not to cause the slightest constriction We do not expect much bleeding if any The wound is large and any exudate may easily escape

In what position do we wish this arm retained? If we flex to an angle of 90 degrees the tone of the biceps muscle will tend to dislocate the head of the radius anteriorly so we put the arm either in a position of about 45 degrees of flexion or 150 degrees of flexion so that the pull of the biceps will be more longitudinal We believe the position of 45 degree is better because there will be less tension on the soft parts surrounding the elbow and the

Fig 368 —A t v flex n (l ft) a t t ns on (r ght) x w ks f ll w g inj ry

collateral circulation will be less embarrassed A molded posterior plaster splint will hold the arm in that position

The compresses are to be changed daily An immunizing dose of tetanus antitoxin is to be administered within twenty four hours

If this patient were beyond middle age we should expect some circulatory disturbance distal to the torn brachial artery gangrene or other nutritional disturbance of a less extent in the skin muscle and bone The elbow is surrounded by a very excellent collateral circulation Anteriorly we have the branches of the anastomotica magna artery above and the radial and recurrent arteries below Posteriorly we have the branches of the anastomotica magna and the inferior branches of the pro-

fundæ arteries above and below the ulna recurrent artery and the interosseous recurrent artery

On the sixth day the radial pulse was palpable

On the tenth day passive motion was begun

Discharged from the hospital on the seventeenth day 15 degrees of active motion present Primary union of wound

Plaster dressings removed at the end of six weeks Condition of arm (Fig 368) Present condition (Fig 369)

Fig 369 —Active flexion and extension at end of nine weeks

We are in no great hurry to get complete extension of the elbow In a position of complete extension great strain is exerted upon the lateral ligaments this we hope to avoid

The sudden complete tearing of the brachial artery in the region of the elbow joint with only the slightest transitory ischemia digitally is a fact worthy of recording

TORSION OF SPERMATIC CORD GANGRENE OF TESTICLE WITHOUT TRAUMA

PATIENT aged thirty five entered Mission Emergency Hospital one half hour ago

This man has always had a tender movable mass in the left groin near the spine of the os pubes The left testicle is absent from the scrotum

Four days ago patient first noted a throbbing pain located in this movable mass and the mass suddenly became tender Pain increased Tuesday and considerable swelling was noticed There is absolutely no history of any gastro intestinal disturb ance Bowels moved well this morning No history of any venereal infection At present his temperature is 100 4 F rectally There is a leukocytosis of 12 500 82 per cent polys Examination of urine is negative Rectal examination negative

This is not a picture of an inguinal adenitis There is no evidence of any infection in the region drained by the inguinal glands rectum genitalia or left limb The history is not that of a strangulated hernia involving gut although an appendices epiploicæ originating from the sigmoid becoming incarcerated and later strangulated might give this picture There is no history of injury that would lead us to suspect a traumatic orchitis The absence of venereal infection would eliminate the probability of epididymitis This condition apparently has to do directly with the undescended testicle It came on suddenly and grew gradually worse although the pain at present has somewhat lessened

The history and course of the symptoms leads us to suspect that something has happened to interfere with the circulation of the testicle

Gas and oxygen anesthesia Incision parallel to Poupart s ligament over the most prominent portion of the inguinal mass The superficial fat is slightly edematous As the aponeurosis

of the external oblique muscle is cut a sac under tension filled with dark colored fluid bulges through the incision A small opening is made in the sac and a considerable quantity of bloody transudate escapes This small opening is enlarged and the sac the distended tunica vaginalis contains the testicle which is bluish black in color (Fig 370) The tunica vaginalis is not reflected from the testicle but completely envelops the testicle and is reflected from the cord about 1½ cm superior to the testicle There are two complete twists to the left in the cord

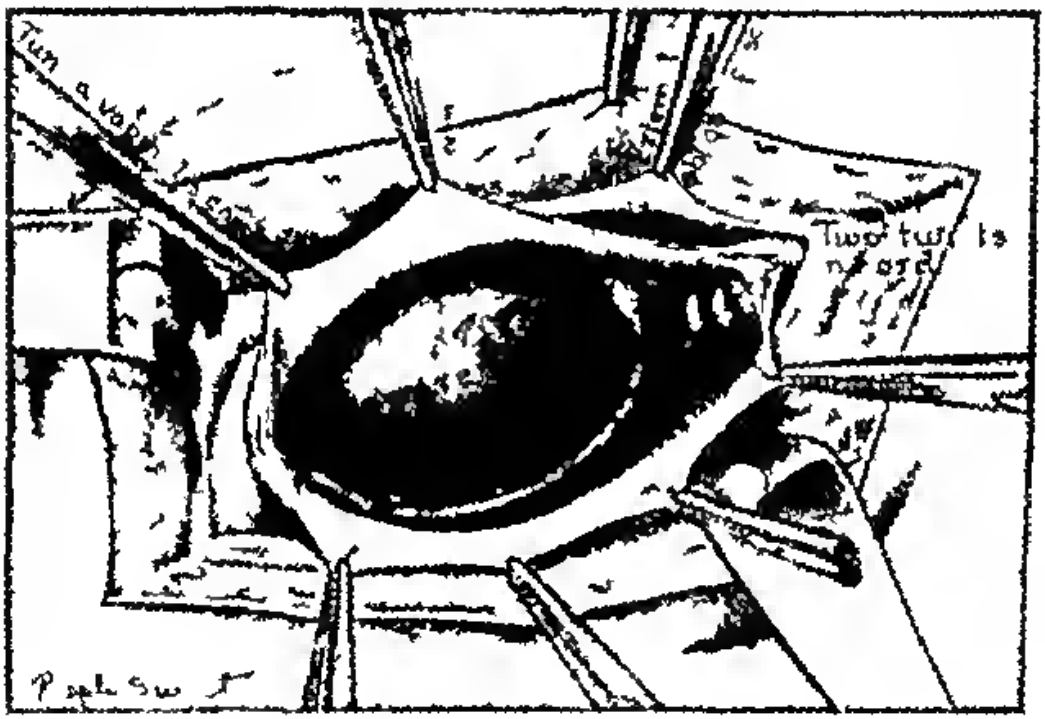


Fig 370—Gangrenous sclerosis of the left testicle and inguinal canal

these twists taking place within the tunica vaginalis All the vessels are thrombosed as there is no change in color when the cord is straightened Ligation of the cord high up superior to the reflexion of the tunica vaginalis Cut end of cord retracts within the internal ring No hernial sac is encountered Testicle and tunica vaginalis ablated Conjoined tendon internal oblique muscle and transversalis muscle sutured to Poupart's ligament throughout Aponeurosis to external oblique closed completely

Postoperative course of this case was uneventful

Patient discharged thirteenth day—well

The finding of gangrene of the testicle coming on spontaneously from torsion of the cord and testicle within an abnormally large tunica vaginalis is very unusual and in my opinion warrants the making of this report

CLINIC OF DR GEORGE WARREN PIERCE

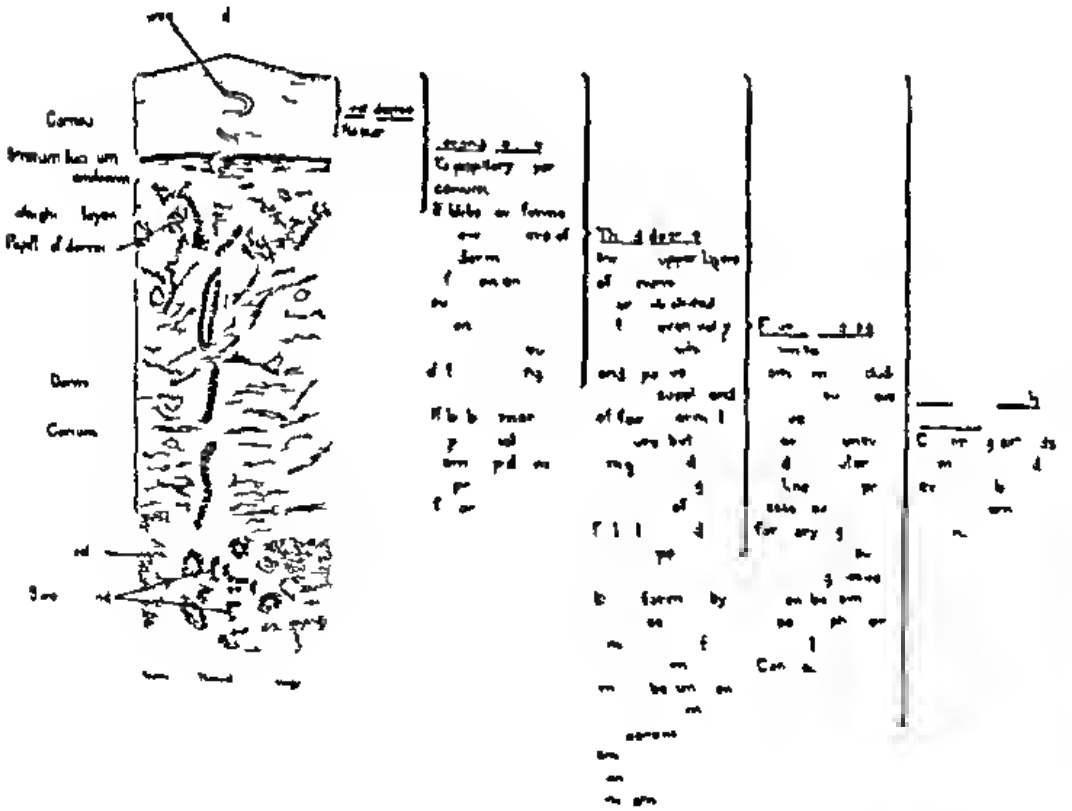
St Francis Hospital

SURGICAL TREATMENT OF BURN SCARS

The treatment of scars from burns presents many difficulties to the surgeon yet much can be done by plastic surgery to relieve the cosmetic and functional deformities Accurate knowledge of the tissue loss and of the principles and possibilities of plastic surgery will enable one to offer to such patients improvement in appearance and relief from contractures

The following outline with the accompanying chart will refresh the memory as to the structure of the skin

Section of skin showing degrees of burns



I Epidermis epithelial layers derived from the ectoderm
  1 Corneum or horny layer—superficial epithelial plates
  2 Stratum lucidum—absent where the skin is thin
  3 Stratum granulosum—absent where the skin is thin
  4 Malpighian or germinal layer—nucleated growing cells
II Derma or corium—connective tissue elements from the mesoderm
  1 Papillary layer
  2 Reticular layer

The classification of burns in six degrees after the manner of Dupuytren is more accurately descriptive than is the American classification in three degrees Dupuytren's classification is briefly this

First degree burns Involve only superficial layers of the epidermis No scar remains after this degree though a slight and transient pigmentation may occur

Second degree burns Involve the whole thickness of the epidermis as far down as the papillary layer of the corium which layer is left intact When the blister which results from this degree of burn is superficial and more or less of the epidermis is preserved on its floor healing takes place readily in a few days to a week and is so complete that no trace of the injury remains except perhaps a slight pigmentation which soon disappears On the other hand if the bleb has formed entirely beneath the epidermis and denuded the papillary layer of the corium or more so if the contents have been allowed to become septic and superficial ulceration has supervened then an alteration in the texture of the healed skin as a definite scar is inevitable

Third degree burns The epidermis and the superficial layers of the corium are more or less completely destroyed and form the dead piece of burned skin named the eschar After the eschar comes away a raw surface is left Healing then gradually sets in with a new growth of epidermis in the form of a fine film which spreads in from the edges and from small foci of epidermis which have escaped burning and appear dotted here and there over the granulating surface and which are either the remains of the basal layer or of pilosebaceous

follicles The islets of epidermis spread and coalesce into irregular patches which finally join with the new growth from the edges The scar which results is pinkish red in color at first and remains so for a considerable time but eventually becomes whitish and opaque It is usually supple and of a fairly normal texture but is smooth and glossy owing to the absence of hair follicles and sweat pores Where the scar has been formed by the coalescence of small foci it may be uneven on the surface and assume the appearance of a meshwork of small cicatricial bands including smooth islands of protruding scar tissue

Fourth degree burns Not only is the skin involved to its whole depth but as a rule the destruction reaches the subcutaneous tissue After the eschar separates the raw surface heals slowly for the new growth of epidermis must take place entirely from the edges as the epidermal cells of the sloughed area have been completely destroyed It has been estimated that the new growth occurs at the rate of about $\frac{1}{8}$ inch per week The scar from burns of the fourth degree is invariably uneven and may be unsightly it is irregular in outline and not infrequently stellate with processes extending for varying distances into the surrounding tissue As a general rule it may be said that the more rapid the healing the better the type of scar which will result and that where healing is delayed for some reason or another it is liable to be associated with a more or less excessive formation of scar tissue

Fifth and sixth degree burns The charring extends down through the skin and subcutaneous tissue to the muscles and even to the bone Large burns of this degree are always fatal but if limited to a hand or foot recovery may take place with amputation [1]

Early skin grafting in the treatment of burns of the third and fourth degrees is of the utmost importance as a preventive of thickened scar cosmetic deformity and contractures as well as markedly shortening the convalescence from the commoner fourth and the rarer fifth and sixth degree burns Granulation tissue is the parent of scar tissue and as the rate of epithelial growth from the edges of a wound has been estimated as $\frac{1}{8}$ inch

per week the granulation tissue in the middle of any large fourth degree burn must of necessity be excessive when epithelialization is eventually complete unless skin grafting be done Modifications of Esser's epithelial inlay are applicable to almost all healing burns even in the presence of some infection The principle of Esser's method is the use of a dental modeling wax model of the defect to obtain accurate apposition of Thiersch graft to the granulation tissue and to prevent a destructive gathering of serum under the graft In the grafting of large areas on a flat surface I have found that by using large meshed paraffined gauze next to the graft and then applying warm dental modeling wax over the gauze that slipping of the graft is prevented The edges of the gauze which extend beyond the grafted area should be firmly strapped down with adhesive In this way the graft may be safely inspected at any time if the necessity arises though rarely need it be looked at till the tenth day

The use of paraffin wax treatment especially in second and third degree burns hastens recovery and reduces scar tissue by more rapid epithelialization In third degree burns epithelialization progresses from the lining of the pilosebaceous follicles appearing as numbers of small islands and the paraffin wax dressing is the only dressing which does not damage to some extent these delicate epithelial cells

Keloid following burn scar results in extreme cosmetic defects Any injury to the corium may result in keloid so that it may follow any but first degree burns There seems to be some stimulus from burns or from the products of tissue disintegration peculiar to burns that favor this variety of new growth for a far greater proportion of burn cicatrices show this condition than do scars from lacerations Keloid is a fibrocellular new growth of the corium starting in the corium about the vessel as Warren and others have shown and consists of dense bundles of fibrous connective tissue running parallel to the surface and usually in the direction of the long axis here and there however they run vertically The whole cutis is occupied by this new formation a layer of loose connective tissue which

is more or less highly vascular separating it from the epidermis incompletely encapsulating the growth the tumor itself is not however rich in blood vessels Nuclei and spindle shaped nucleated bodies are noted in some abundance along the vessels in the periphery although scanty in the body of the growth According to Warren the vessels are affected far beyond the body of the keloid mass and this probably explains its recurrence after what would appear to be a complete removal of the tumor The glandular structures hair follicles and muscular fibers are not found within the growth but are pushed aside where they are according to Crocker noted to be copiously infiltrated with round cells obscuring or even breaking up their structure It is a benign growth but may from irritation become malignant [2]

At present x ray and radium therapy seem to offer the best results in combating keloid At the first sign of hypertrophy of a burn scar radiotherapy should be used which acts in retarding or removing the growth I have had excellent results as have others by combining excision and radiotherapy Case II illustrates successful removal of a badly disfiguring keloid of the face following a burn from an explosion of gasoline As in this case x ray over the area excised and over the flaps was used both before and after operation so should it be used in all of these cases the number of treatments after operation depending on the evidence of return of the growth

A great variety of treatment has been offered for this condition—pastes lotions fibrolysin injections of creosote etc but none of these gives results comparable to those of radiotherapy Ahlswede has recently recommended the use of pepsin to digest these growths a solution of this composition—pepsin 10 gm HCl 1 c c phenol 1 c c aqua dest q s ad 200 c c I have tried this over a period of several weeks on the keloids on the chest in Case II with apparently some favorable results

For the surgeon only occasionally attacking the problem of repair of a bad burn scar a few essential rules will prove to be invaluable guides The first requisite is an accurate estimation of the tissue destroyed If it is all appertaining to the surgeon

to prepare a flap carefully and then after dissecting out the scar to discover that the amount of tissue lost and the retraction of the freed tissues far exceeds the size of the flap already prepared The multiplicity of flap operations evolved by surgeons of the past are disconcerting when studying the best method of attacking a plastic problem It is better to consider flaps of three types—the sliding flap the transposed flap and the pedicled flap The first is the advancement of tissue nearby into the defect by undercutting and sliding the second is a transposition of tissue with the base of the flap at the defect and the third is a bridging over of the tissue from a distance Blair's suggestion to prepare the flap lift it from its bed and then suture it back again for several days is excellent The blood supply to the flap is increased and if all of the flap lives in this position it is almost certain to do as well in the new location All large transposed and pedicled flaps should be treated in this manner They peel off easily and quickly when raised the second time by merely recreating the skin incisions and applying gentle traction *Do not make flaps crossing the midline of the body especially in the abdominal region* The blood vessel anastomosis between the vessels of the two sides in the region of the linea alba is very limited and with one patient I experienced the failure of a flap in this location with a prompt necrosis of tissue at the linea alba Before preparing any flap study the blood supply carefully The skin surrounding burn scars of the third and fourth degrees is very often dotted with scars of lesser degree which are scarcely noticeable until a flap is raised when their presence will be very evident from the failure of circulation Also when burns have been followed by infection the subcutaneous tissue has often been affected for some distance from the burns scarring the under surface of the flap and jeopardizing the blood supply

Gillies method of tubing pedicled flaps is invaluable as thus not only is the blood supply increased but also the chance of infection is diminished and tissue from a distance is made available The tissue may be transported by transposing first one end and then the other waiting long enough each time for a

good blood supply to be established Case I was so extensively burned that it was necessary to obtain tissue from the pubic region to replace the contracted scar at the right anterior axillary pillar The tubed pedicle was transplanted four times to get it to its present position where it is available for use

Flaps should be anchored by subcutaneous catgut sutures so that no strain comes on the skin sutures

Gillies suggestion for the after treatment of flaps has turned many potential failures into successes Warm compresses of normal salt solution with occasional gentle massage will encourage a sluggish circulation or prevent the equally fatal overengorgement of a flap

Skin grafts are less effective than flaps in the repair of these scars but they are indicated for certain conditions The Thiersch graft and Wolfe graft are of greater value to the plastic surgeon than are the other types The Thiersch graft applied after the method of Esser s epithelial inlay with its numerous modifications, is most reliable If correctly done this method of grafting is almost always completely successful Two points must be kept in mind during the operation—first to obtain an accurate model of the defect in dental modeling composition and second to maintain a firm even pressure on the model after it has been wrapped about with a Thiersch graft and applied to the wound Where the graft is completely buried the tension on the graft is of course even but on flat surfaces special attention must be given to the pressure Use of this type is indicated to line the under surface of a flap which is to form part of the eyelid nose or mouth or where a flap is needed with epithelium on both sides Ectropion of the lids which often follows burns in the region of the eyes may be most efficiently corrected by Gillies operation which is an adaptation of Esser s principle These buried grafts seem to resist infection better than do grafts on flat surfaces and they are quite successful within the mouth or nose Larger grafts of this type often show a tendency to shrink even though the scar has apparently ceased to contract before repair is done

Wolfe grafts or whole thickness free skin grafts should only

be attempted on a firm base such as the forehead They do well with a firm gentle pressure applied over a dental modeling composition backing The use of this type is limited and the possibility of failure of the graft together with the frequent tendency of a successful graft to become pigmented causes the surgeon to rely mainly on the flap

CONCLUSIONS

1 Different degrees of burns give different types of scars An accurate estimation of the amount of tissue lost is essential as the first step in repair of scars

2 Early skin grafting of burns tends to a better scar and fewer contractures

3 Keloid is a new growth and yields best to radiotherapy Excision with radiotherapy is often indicated

4 Plastic repair of burn scars is best done by flaps The surgeon should rely mainly on the basic types of flaps

5 Skin grafts are limited in their application but are valuable about the eyes nose and mouth Esser's method of epithelial inlay has many uses and is very reliable

The following case histories with photographs are of cases which are not yet finished However they illustrate some of the principles of the plastic repair of burn scars

Case I—Mrs M This is a case of extensive second third and fourth degree burns with keloid formation and contracture deformity of both anterior axillary pillars Patient is white thirty four years of age a dressmaker and is married Her past history is essentially negative except for appendicitis in 1919 for which appendectomy was performed On October 14 1921 she was burned by a gasoline explosion while cleaning a piece of lace Burns involved the face neck arms and body extending to the umbilicus She was in hospital three and a half months and burns were treated with boric and saline compresses also chlorazene compresses and paraffin wax dressings Part of the areas were skin grafted She was referred to me on March 25 1922 Figure 371 shows her condition at

that time and shows the limit of possible abduction of the arm On March 30 1922 the larger horizontal keloid on the front of the neck was dissected out and a flap 7 cm wide was taken from the side of the neck and transposed to the defect Even this

Fig 371

Fig 372

Fig 373

Figs 371–373—Case I

width flap was not sufficient to relieve all the contracture Though no scarring was apparent on the outer surface of the flap the under surface proved to be pitted with scars from infection of the wound during time of healing and the distal

fourth of the flap was lost This step also illustrates the mis leading appearance of scars in relation to the amount of actual tissue lost On April 25 1922 a tubed pedicle graft was raised on the abdomen in the region of the right lower quadrant this being the nearest point to the right shoulder that normal tissue sufficient for repair could be found May 15th the lower end of this flap was transferred upward to the position shown in Fig 372 September 13 1922 the scar of the anterior axillary pillar on the left side was excised and a sliding flap comprised of the tissue of the left side of the chest was swung upward The tubed pedicle was also transferred again Function in the left shoulder as is present now (March 9 1923) is shown in Fig 373 All active motions are practically normal There is a slight keloidal hypertrophy of the scar of operation but this is yielding to radiotherapy Figure 373 also shows the present situation of the tubed pedicle after the fourth transfer where it is ready to be used for the area of the anterior axillary pillar of the right side where the scar will be dissected out This case has had considerable radiotherapy Pepsin compresses were also tried on the chest apparently with some success though no authoritative statement of the value of this treatment could be given without a series of cases with controls Con siderable work remains to be done on this case

Case II—Mr G illustrates very marked keloid formation He is white twenty one years of age and there is no history of keloid scars in his family His past history is negative except for measles and an otitis media from an oat in the ear At the age of nineteen (March 1 1921) he was burned in a gasoline explosion and suffered second third and fourth degree burns of the face forehead neck and chest and fifth degree burns of the ears He was confined to hospital thirty days and during the first two weeks was delirious He stated that the burns were treated at first with unguentin and later with paraffin wax dressings No skin grafting was done and the burns were healed within six weeks He was referred to me on September 10 1921 and the keloid growths had then reached the proportion

Fig 374

Fig 375

Fig 376

Fig 377

Fig 378

Figs 374–378—Case II

shown in the illustrations (Figs 374–376) in three months from the time they were first noted The scar of the upper chest and neck had contracted limiting tilting back of the head He was observed for two months but no increase in growth was seen and during this time radiotherapy was used on the scars The greatest thickness of keloid was confined to the lower face and upper chest and to lesser extent to the forehead and nose On November 24 1921 a trial operation was done below the left ear to determine whether keloid would return in the scar The area was treated with x ray before operation and then scar 2 x 1 cm was excised and the defect closed by three sliding flaps One week after operation x ray therapy was again used over the area By the middle of January 1922 no keloid was evident where the scar was removed and on January 17th a flap 18 x 5 cm was lifted from the left side of the neck and returned to its bed No necrosis occurred and on January 28 1922 the keloid on this side to the symphysis menti was dissected out and the transposed flap used to fill in the defect x Ray was used on this flap ten days after operation The raw area in the neck was dressed with paraffin wax dressing On April 28 1922 a similar flap was prepared on the other side and the pedicle of the first flap was returned Nothing is lost by leaving these pedicles attached for a considerable period indeed the longer the pedicle remains the better is the adjustment of the circulation If the pedicle is returned within two weeks the flap will usually live but it passes through a period of imperfect blood supply and edema occurs which lasts longer

On May 8 1922 the right side of the facial scar was dissected out and the prepared flap sutured in July 13th the pedicle was returned July 31st the tension at the throat was relieved by cutting the scar and allowing the tissues to retract The raw area was grafted by Esser s method A complete take resulted but this eventually contracted On September 5th a readjusting operation about the chin and neck scars was done February 20 1923 a large pedicled flap was prepared on the lower left chest below all scarred areas and this will be tubed and transplanted twice to replace the keloid and contracted scar at the

front of and below the neck Repair of the ears also remains to be done

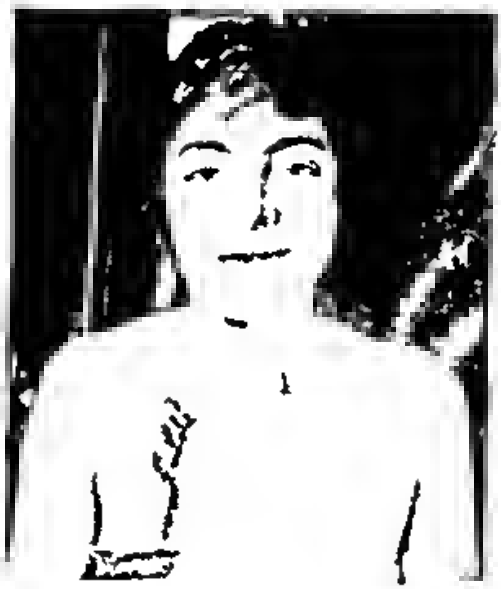
x Ray treatments have been administered six times since the first operation or in about eight tenths of an erythema dose

The results so far are quite gratifying as there has been little if any recurrence of keloid and what little has recurred in the scar is disappearing under radiotherapy

Case III —Mrs C This is a case of a young woman white aged twenty eight who was burned in May 1917 Her past history is essentially negative except for attacks of petit mal beginning one year after her marriage in 1915 During one of these attacks she fell forward on a stove and remained there for some time She suffered second third and fourth degree burns of the lips chin and neck She says that the burns were treated with boric compresses and then skin grafted and that healing was complete in three months (Figs 379 380) Six months later as the chin had been pulled down by the scar contracture a flap was transposed from the chest into the scar in the neck This proved to be insufficient for a year later the chin was again pulled down She was referred to me March 15 1922 At that time the chin could not be raised above the level and scar extended in a straight line from the point of the chin to the chest Three days later the scar in the neck was dissected out the old flap freed and allowed to retract normally and a large flap from the chest was transposed to the defect The large and small flaps may be seen in Fig 381 Three weeks after the transference of the flap the pedicle was cut and returned and the small flap was split to receive the free end of the large one thus evening the tension (Fig 382) On April 28 1922 a small transposed flap from the side of the neck was let into a transverse scar on the left side of the neck The right corner of the mouth was also reconstructed as it was obliterated by scar On February 10 1923 the subcutaneous fat from below the chin was turned up to make a point of the chin and some tissue below the lower lip was removed to restore the normal curves of the lower lip and chin This step is not shown The scars in Fig 382 seem

Fg 379

Fg 380



Fg 381

Fg 382

Fg 383

Fg 379–383—Ca III

prominent but the picture was taken a short time after operation and they have since faded Two postoperative x ray treatments were given The pouting of tissue shown on the side of the neck and at the base of the large flap in Fig 383 is to be removed

BIBLIOGRAPHY

1 Macleod Treatment of Burns pp 3–15
2 Stelwagon Diseases of Skin pp 665–671

In order to have the maximum benefits from a colostomy we must completely divert the fecal stream This can best be accomplished by complete severance of the continuity of the bowel and wide separation of openings

The question of control of an artificial anus has caused much discussion The best functioning colostomies are apparently those that are brought out through the rectus muscle and fascia The presence of a dependent loop of colon such as is possible when the redundant sigmoid or transverse colon is used is a real asset to better function This dependent reservoir acts like the ampulla of the rectum and accumulates considerable feces before emptying The extraperitoneal subcutaneous tunnel of gut gives an additional factor which improves function and control

The ultimate success of the colostomy performed depends upon proper regulation of the bowels after operation A normal rhythm of evacuation and the prevention of liquid stools are fundamentally essential The bowels should be encouraged to move at a regular time each day by suitable dieting and avoiding aperients In most cases a very satisfactory control and regulation can be obtained in a few months trial If control is not satisfactory an enema each morning will serve to regulate the movements

An abstract of the case history of one of these patients will be given and a method of treatment outlined

Case History.—Mrs E C aged twenty nine Case No 59 860 San Francisco Hospital

Complaint.—Multiple perineal fistulæ rectal incontinency rectal stricture increasing constipation loss of weight

Past History.—Irrelevant History of questionable Neisser infection and proctotitis (neisserian?) three years ago No history or evidence of lues or tuberculosis Wassermann negative

Present Illness.—Began two years ago with pain in rectum and passage of blood Since then patient has had multiple perirectal abscesses incised and each has persisted as a discharging fistula Six months ago an annoying rectovaginal fistula developed In spite of multiple rectal operations the

fistulæ persist and patient has no sphincter control Bowel movements only with enema Small ribbon like stools Loss of weight

Physical Examination—Quite negative except for rectal condition Note on rectal and proctoscopic examination, There are multiple perirectal fistulæ present Sphincter has been cut twice and largely replaced by scar tissue Two cm from anal cutaneous margin is a stricture that will not admit the tip of little finger This stricture was with difficulty dilated sufficiently large to admit a small proctoscope which disclosed a second stricture about 9 cm from the first Between these two strictures is an area of marked ulceration into which most of the fistulæ open Vaginal examination disclosed a recto vaginal fistula opening into posterior fornix

Recommendation—Some form of a colostomy operation that will completely divert the fecal current and afford an opportunity to irrigate the distal segment The nature and extent of the pathology present practically necessitates that the colostomy be permanent

Operation—The technic as outlined in this case is my resultant effort of repeated attempts to overcome practical difficulties in the operation for colostomy

Step 1—Left rectus incision 3 inches long is made through the outer third of rectus muscle just below umbilicus (Fig 384)

Step 2—Peritoneum opened and general exploration done to determine the nature and extent of the pathology present and the practicability of further radical procedures resection etc

Step 3—Loop of most mobile sigmoid withdrawn from wound and held by assistant First layer of sutures now placed which closes the peritoneum and stitches the parietal and visceral peritoneum together where the constricted loop of sigmoid comes through the incision (Fig 385 *a*)

Step 4—Rectus muscle and anterior rectus sheath closed with chromic gut snugly about the constricted loop of sigmoid In suturing the proximal loop to anterior sheath an attempt is made to telescope the bowel (Fig 385 *a*) (This theoretically forms a valve like action in addition to the muscle constriction)

Step 5—Sever the bowel between two Payr's clamps with cautery (Long proximal and short distal loops) (Fig 385 *a*)

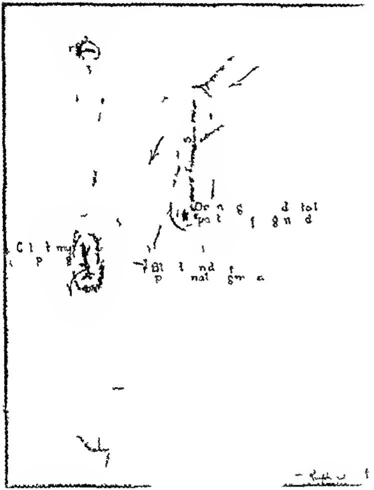


Fig 384—W de p at f pe gs P x mal pe g n the rted d d t t me e t ry D t l lo p h mall fic

Invert both ends with usual inverting basting stitch (Fig 385 *b*)

Step 6—Dissect the median flap of the incision from anterior rectus sheath The proximal loop is now stitched to the anterior

rectus sheath and its distal end brought out through a stab wound above pubes (Fig 386)

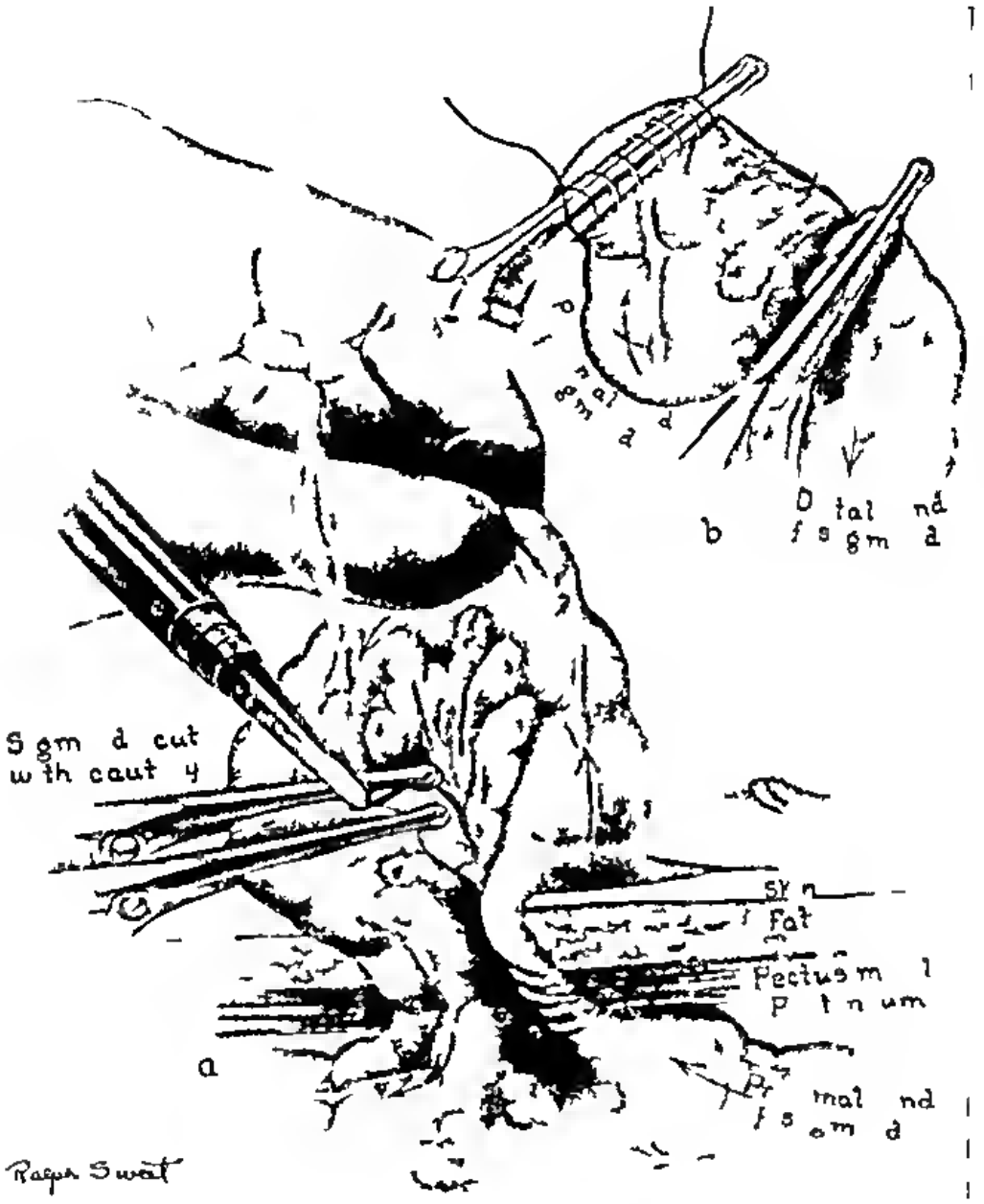


Fig 385.—*a* Division of continuity of the colon and its mesentery (Peritoneum has been previously closed) *b* Aseptic technique of uniting severed ends

(Note Great care must be exercised to avoid impairing circulation to divided segments A slit parallel to the vessels will often materially aid in mobilizing the mesentery The site

of future colostomy is made about 2 cm from inverted end to avoid hazardous torsion and traction on the mesenteric vessels (Figs 384–386))

Step 7 —The distal inverted loop is brought up to lower end of original incision which is now closed completely The

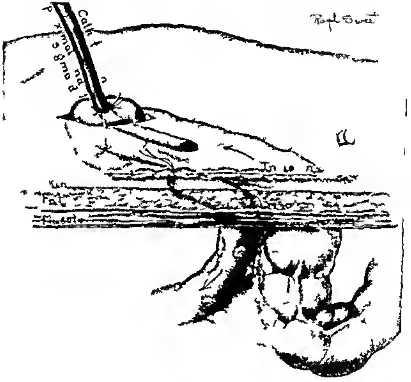


Fig 380 —C nd t mm diat ly po t pe t (Bl d distal gme t *buried nd c th t r fa t d i t p mal loop)*

inverted segment is buried but its location marked by a single linen suture which protrudes from wound (Fig 385)

Step 8 —A rubber catheter is inserted into portion of proximal loop protruding from the stab wound and secured by inverting purse string sutures (The catheter will drain the gas and fluid content of the proximal loop for twelve days when colostomy

opening may be established without fear of infecting abdominal wall (Figs 385 386)

Postoperative Course —(*a*) Wounds should heal *per primam* (*b*) The patient will be given non residue diet and mineral oil for the first ten days Give regular diet when the catheter is removed and colostomy opened (see text for diet postoperative care etc) (*c*) After the twelfth day the distal loop may be

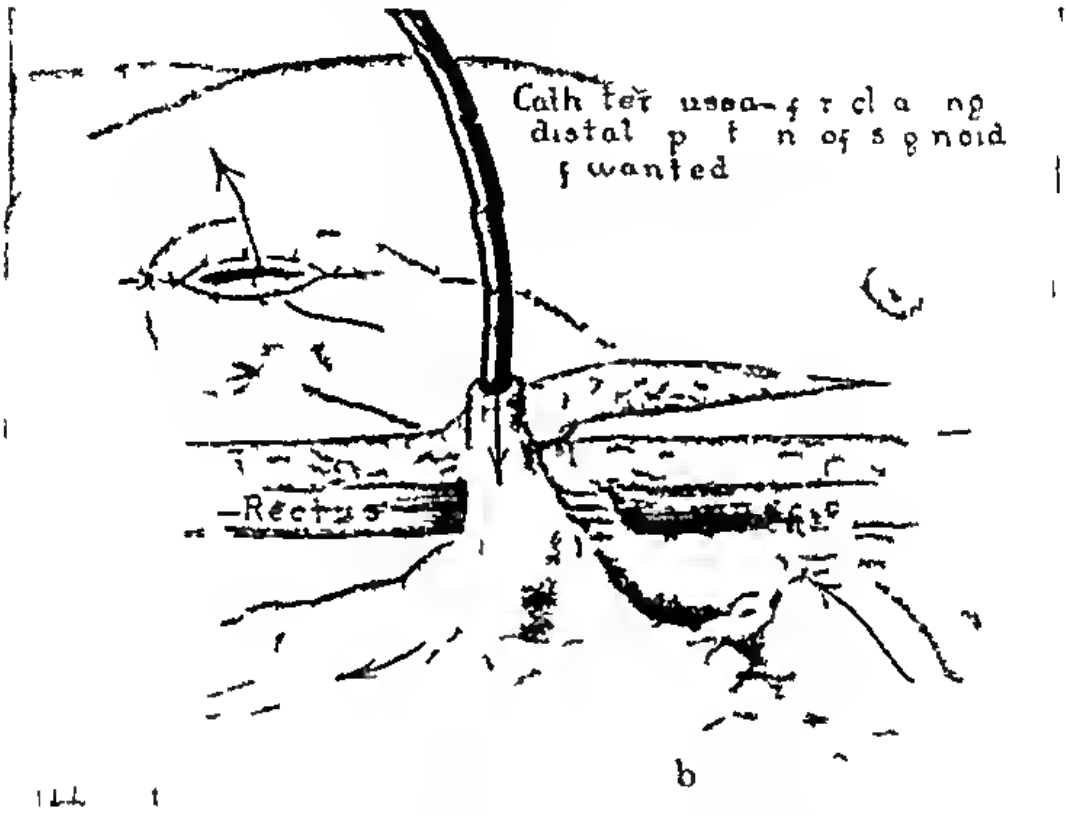


Fig 387 —Lateral view (Plastic mucocutaneous opening made for proximal loop Small opening in distal loop for irrigations etc)

located and the opening made sufficiently large to admit catheter for irrigating the diseased lower segment (Danger of infecting original incision is now past) (Fig 385)

At this time excess of mucosa from proximal loop may be removed and a plastic mucocutaneous union established (Fig 387)

Postoperative Note (Three Months After Operation) — Patient has gained 35 pounds in weight and is very pleased with

the colostomy which rapidly restored her general health and cured the annoying multiple perineal fistulæ The patient has one bowel movement in the morning and the balance of the time wears only a small piece of gauze over the openings (She has discarded her colostomy bag entirely) Examination shows the process of perirectal healing and cicatrization has resulted in complete closure of the multiple fistulæ and the rectal canal itself will hardly admit a small probe The colostomy is not a source of embarrassment to this young woman but on the contrary it has enabled the patient to resume her work and lead an active social life again

Comment —The operation as outlined has proved to be a practical aid in relieving the shortcomings of the usual colostomy procedures The simple technic involved is flexible and can be varied to meet the individual case Some of the apparent possibilities of such a technic are (1) Careful exploratory laparotomy (2) A good functioning temporary or permanent colostomy (3) Complete diversion of fecal current (4) Wide separation of openings and hence no annoying fecal accumulation in distal segment (5) Opportunity to irrigate distal segment satisfactorily (6) Avoids retraction or prolapsus of mucous membrane (*c*) Opportunity for secondary operation (*a*) Ability to reunite the continuity of the bowel by extraperitoneal methods (*b*) Distal segment may be removed in whole or part

The University of California Service at San Francisco Hospital has offered ample opportunity to establish this operation as the technic of choice in suitable cases

I am indebted to Dr Harold Brunn for the opportunity of carrying out this work on his service at the San Francisco Hospital

CLINIC OF DR ALICE F MAXWELL

University of California Hospital

PELVIC INFLAMMATORY DISEASE

Here are three women who come to the clinic complaining of lower abdominal pain and profuse menstrual discharge

Case I—The first Mrs W aged thirty nine widow for twelve years

Family history negative Past history ordinary childhood illnesses No serious sickness or operations

Catamenia began at thirteen twenty eight day type at times irregular normal in amount no pain

Married at seventeen Three children living and well aged nineteen thirteen and twelve No miscarriages No vaginal discharge

Patient gives no history of any cardiac respiratory intestinal or urinary pathology

Present Illness—Patient was perfectly well until January 29 1923 when she was seized with a lower abdominal pain This pain was at first a dull ache but with the onset of the menstrual period one day later the pain became generalized over the entire abdomen and very severe There was no nausea or vomiting until four days after the onset of the pain in the abdomen Then the vomiting became constant and consisted of dark stained fluid This vomiting and severe pain continued for seven days without relief by opiates The patient s bowels had moved once during the present illness following a large dose of castor oil taken the first day The patient was brought into the hospital on February 5th one week after the initial pain She presented the typical Hippocratic facies—dry skin sunken eyes weak thready pulse

Physical examination negative save for marked tenderness over the entire abdomen but most marked in the lower half where the walls are held rigidly and board like On vaginal examination the mucosa was hyperemic in appearance the urethra was without evidence of inflammation A thick yellowish discharge slightly blood tinged was exuding from a lacerated cervix The uterus was of normal size the slightest movement causing extreme pain The broad ligaments were filled with tender fixed masses Vaginal examination was extremely painful The entrance temperature was 36 4 F which rose to 38 F within twelve hours (17 000 white blood cells 75 per cent hemoglobin to 19 000 with 92 per cent polynuclears) Urine dark amber few pus cells slight trace of albumin

Discussion —Here we had a woman acutely ill presenting symptoms of an intra abdominal crisis of one week's duration The dry skin sunken eyes pallor (peritonitic facies) the continuous vomiting abdominal pain rigidity and rapid thready pulse were text book symptoms of a peritonitis The fever and leukocytosis were confirmatory evidence

The patient's history was not of significance except for the fact that the onset of the attack was definitely related to the menstrual cycle Of course it must be borne in mind that the occurrence of an abdominal crisis i e acute appendicitis cholecystitis rupture of a peptic ulcer etc may be coincident with the catamenia yet such pathology may have no causal relationship On the other hand the symptoms of a recent pelvic infection or a chronic pelvic peritonitis are very frequently exaggerated by the pelvic circulatory alteration associated with menstruation The rigidity distention abdominal pain vomiting and constipation are characteristic only of a peritonitis

The significant findings however are first the greater rigidity or increased pain in the lower abdomen equally marked in both lower quadrants a perforated appendix or ulcer would be followed by peritonitis which would by gravity tend to localize in the lower abdomen However we would expect unilateral involvement or evidence of more marked infection on one side of the hypogastrium Important also was the fact that the

symptoms had existed for a week before entrance practically unchanged With perforation of a hollow viscus after an interval of a week we would expect to find either a walled off abscess especially if the appendix were the etiologic factor or a generalized and progressively spreading peritonitis Another significant finding was the evidence of inflammatory reaction in the pelvis involving both broad ligaments with sausage shaped tender masses on either side of the uterus Despite the absence of any history of an old or recent pelvic infection the onset of lower abdominal pain incident to menstruation was highly significant

A cervical smear was taken which showed a field filled with leukocytes and Gram negative intracellular diplococci This of course was highly confirmatory evidence of a pelvic infection However a negative smear does not rule out a neisserian infection for it is not always possible to demonstrate the gonococcus especially in chronic cases In this woman there was no evident infection of Bartholin s glands or Skene s glands at the urethral orifice a frequent nidus for the organism Following a menstrual period the diplococcus may be obtained from the cervix whereas frequent examinations between the cycle may be entirely without result Briefly then this woman presents a picture of an acute peritonitis localized to the pelvis and lower abdomen with evidence of bilateral salpingitis and the gonococcus as the probable infecting agent

The treatment should be conservative All attempts at therapy should be aimed to limit the infection to the pelvis and lower abdomen to control the vomiting and pain and to administer food

The patient was placed in the Fowler position and this position was maintained for a considerable period Glucose and sodium bicarbonate were given by Murphy drip To relieve the vomiting lavage was done and repeated when indicated by return of symptoms Large amounts of salt solution were given subcutaneously (2000–4000 cc) An ice bag to the lower abdomen and morphin sulphate controlled the pain Twenty four hours later the patient was distinctly improved and the

vomiting ceased The woman continued however to run a fever ranging from 38 to 40 C for a week when the temperature slowly subsided Five days after entrance an indefinite mass appeared on the left side reaching as high as the umbilicus With the onset of an acute diarrhea the tumor gradually disappeared simultaneously with a great amelioration of the lower abdominal pain This deserves a word of comment Occasionally a collection of pus originating from a pelvic infection may be walled off by the bowel and finally perforate the structure Such a complication may be followed by serious consequences and spread of the peritonitis or the evacuation of the pus pocket may be the beginning of the healing process

Four weeks after her illness began her temperature became normal and the leukocytes dropped to 14 500 Her temperature has been normal now for two weeks and the leukocytes are 8000 It is six weeks since the patient became ill She is the main support of her children and is most anxious to resume her duties

The patient is brought down for operation today because we feel that after six weeks her pelvic infection is well walled off and the pelvic organs can be explored without much danger of spreading the infection into the general peritoneal cavity With the onset of menstruation her symptoms may become acute which will prolong her hospitalization

The patient is anesthetized with gas and oxygen and the vagina carefully cleaned with lysol (½ per cent) sterile water soap and alcohol The bladder is emptied by catheterization followed by an instillation of 10 c c of Argo 3 1 200 Under anesthesia the uterus is felt to be slightly enlarged and fixed Masses the size of an orange distend both broad ligaments

The abdomen after being scrubbed with alcohol ether and iodin is opened in the midline by an incision from the umbilicus to the pubic hairline We feel that a long incision offers the advantages of an easy exposure of the pelvis which increases the speed and facility of the surgical procedures On cutting through the skin muscles and fascia we are impressed with the amount of bleeding from these structures We have noticed that this congestion is always present with an inflammation in

the lower abdomen We are careful in incising the peritoneum for it is possible we may find loops of small bowel adherent to the parietal peritoneum a pretty example of nature s method of limiting the spread of infection On opening the peritoneum we see the omentum plastered to the anterior abdominal wall to the bladder, and completely covering over the pelvis By gentle dissection this omentum is freed Releasing the bladder which feels thickened a pus pocket is opened up immediately below the symphysis The pus is quickly sponged away although we are not unduly concerned with the danger from this material for the patient has undoubtedly developed a considerable immunity to this infection As the omentum is freed from the bladder the fundus of the uterus is exposed Notice the congested appearance and the adhesions of several loops of the small bowel to its posterior surface It is of interest that the uterus is in anterior position It is rather more frequently found retroposed being drawn backward by the adhesions forming between the posterior layer of the broad ligament as a result of the spread of infection from the fimbria of the tubes The fundus of the uterus is grasped and drawn upward by clamps The loops of small bowel are released from the pelvis and now the general peritoneal cavity is protected by packing off the bowel by a large rubber dam Both tubes are buried in the pelvis and the ovaries are covered over by the swollen tubes The adnexa are shelled out of the culdesac which causes considerable oozing from the raw peritoneal surfaces Note the sausage shaped masses which are the tubes The fimbria are completely obliterated The tubes feel hard and indurated and are distended by purulent material As the ovaries are delivered we note that they are enlarged and boggy with reddened adhesions over their surface

We feel that the best interests of this patient will be met by cleaning out her pelvis and removing the damaged organs The ovaries are so hopelessly involved in the infection that their retention may be a liability to the woman We are removing the uterus and cervix which we know harbors the infection and which if allowed to remain will keep up a chronic discharge

Both tubes and ovaries are removed with the uterus Following the closure of the vaginal canal we uture the round ligaments to this structure for support of the vaginal vault There has been considerable oozing from the culdesac and the shaggy raw surfaces left on the posterior layer of the broad ligament We pack the culdesac firmly with warm gauze after a few moments the oozing is controlled Now we cover over the raw surfaces in the pelvis by suturing the free edge of the sigmoid colon to the peritoneum of the bladder with a fine catgut suture As you see this walls off the pelvis and prevents the small bowel from dropping into the culdesac and becoming adherent The raw surface on the bowel are inverted with a continuous No 00 catgut suture and we repair the damages to the omentum with the same material When the abdominal wall has been closed and when the patient is still under the anesthetic we shall allow 2000 c c of tap water to run into the bowel through a funnel and large rectal tube As soon as the patient is placed in bed and before she wakens a hypodermic of heroin or morphin will be given and another liter or liter and a half of water will again be given by bowel This fluid is retained in the large majority of cases and does away with the postoperative thirst and adds to the comfort of the woman during the first twenty four hours postoperative

The next patient is a young woman who enters the hospital complaining of pain in the lower abdomen and vaginal bleeding for ten days

Case II —Miss X aged twenty five

Family history and past history not significant

Catamenia began at fifteen normal in every respect Patient is single Three months ago she was delivered in the obstetrical department of a full term pregnancy The prenatal period was normal except for burning urination and a purulent vaginal discharge both of which appeared in the last five months of the pregnancy A smear was not taken The labor was short and normal Twenty four hours after delivery her temperature rose to 38 C but promptly dropped and remained flat except

for a temporary rise to 37 5° C on the fourth and seventh day postpartum

Present Illness—Three months following delivery the patient was seized with a sharp pain in the left lower quadrant of the abdomen the pain gradually spreading to the right side There was no nausea or vomiting After a few days there was a constant dull ache above the symphysis Two weeks later the patient began to menstruate during which time the pain again became severe The flow lasted for four days After an intermission of ten days the bleeding commenced and the girl has been hemorrhaging continuously for ten days

The physical examination reveals nothing except tenderness over the lower abdomen Pelvic examination shows considerable bloody discharge from a soft hyperemic cervix The uterus is in anterior position normal size and softened Both ovaries feel enlarged and the broad ligaments are infiltrated and tender However there are no palpable masses The temperature at entrance is 36 8 C Leukocytes are normal Urinalysis negative

Discussion—This young woman unmarried has been recently pregnant A significant finding is the history of dysuria frequency and a purulent vaginitis coming on during the pregnancy These symptoms of course are strongly suggestive of a pelvic infection it is unfortunate that no urethral or cervical smears were taken at this time a most favorable opportunity for demonstrating the gonococcus If we grant that the patient became infected during her pregnancy it is of interest to note that her puerperium did not show a more febrile reaction for at the end of labor the decidua and raw placental site offers a most suitable field for the growth of micro-organisms It is well established that a gonococcus invasion of the genital tract rarely attacks the lining of the uterus When the endometrium becomes converted into decidua however this relative immunity is lost and during the puerperal state a true decidual endometritis due to the gonococcus may develop Such a uterine infection from a chronic or recent neisserian infection of the cervix is a frequent cause of puerperal morbidity This pre existing infec

tion is frequently unrecognized and the conscientious obstetrician is often greatly chagrined (after having exercised every precaution to prevent exogenous infection during labor) when an acute endometritis develops The prevalence of this type of pelvic infection in woman is a vital factor in preventing marked and continuous reduction of maternal morbidity and not a lack of appreciation by the obstetricians of the advances made in recent years in surgical technic and asepsis

The elevations of temperature in this girl's puerperium although transient may well be attributed to a decidual involvement Three months after the birth of her child menstruation appeared and again we notice the onset of acute lower abdominal pain just antedating the phenomenon The patient had not had dysmenorrhea previously so that this finding now is very suggestive

A persistent vaginal hemorrhage coming on after a labor must always bring up several possibilities First we always think of retained placental tissue which causes bleeding immediately after delivery or within the early weeks of the puerperium It would not be unusual for a hemorrhage to occur three months following labor from retained fetal elements

A subinvoluted uterus may cause persistent bleeding yet in this condition the uterus is soft boggy and considerably enlarged and is commonly found retroposed and low in the pelvis However the uterus of this patient is softened but not enlarged and is well anterior A chorio epithelioma must always be borne in mind especially after a pregnancy but the hemorrhage with such a neoplasm is very profuse without remissions We feel then that the patient illustrates a clear cut example of a pelvic peritonitis following childbirth due to an endogenous infection with the gonococcus as the etiologic factor although we cannot demonstrate the organism at the present time The history of purulent vaginal discharge and frequent burning urination during pregnancy the low grade fever following delivery and the presence of tender bilateral masses in both broad ligaments make the diagnosis

Treatment—This girl has been in bed for ten days and has

been receiving ergotin and stypticin by mouth She has continued to bleed steadily and has constant lower abdominal pain The question of operative interference must now be considered We are prepared to do a laparotomy today After the usual vaginal cleansing we dilate the cervix The cervix is very soft and is stretched without difficulty This ready dilatation of the canal is apparent when we can see how easily the dilators are passed through the internal os The congestion of the pelvis as a result of an inflammatory reaction will explain the bleeding and softening which we find The endometrium which we move is normal in appearance and amount a finding which rules out a chorio epithelioma from consideration as a cause of bleeding We shall examine the endometrium microscopically but will not expect to find an inflammatory infiltration of the tissue Rather the picture will be that of a glandular hypertrophy and dilatation with dilated blood vessels and possibly a slight round cell infiltration

The abdomen is opened now by a long midline incision and the bowel packed off by a rubber dam Note the hyperemic mottled appearance of the uterus the omentum adherent to the fundus and broad ligaments and the engorged vessels in the bladder peritoneum With gentle dissection these omental adhesions are released and the pelvis is exposed The tubes and ovaries are adherent posteriorly in the culdesac we shell them out from their bed and find that both tubes are sealed off and the fimbria obliterated The tubes are swollen indurated and congested The ovaries are enlarged especially the left Note the numerous bluish cystic structures shining through the cortex and the shaggy reddened adhesions on the capsule Some investigators consider the excessive hemorrhage found so frequently with pelvic inflammatory disease as an expression of an excessive cyst formation in the ovary from a disturbance of circulation

Treatment—The treatment of this girl's pathology opens up a field of wide discussion namely the relative value of radical and conservative surgery in the treatment of pelvic inflammatory disease There is no doubt that both tubes are extensively and permanently damaged so that they are unable to function as

reproductive structures so from that standpoint they deserve no consideration To eradicate the infection in the pelvis we shall do a bilateral salpingectomy The importance of maintaining the utero ovarian harmony and relationship must come up for consideration If we can permit this girl to keep an ovary without undue risk of subsequent pain or secondary operation from the retained gland we know that the endocrine balance of the patient will be maintained and psychic and vasomotor disturbances which follow loss of ovarian tissue will be prevented The right ovary although showing inflammatory changes *i e* enlarged and covered with adhesions is more normal than its fellow it shall be retained for its endocrine and menstrual function We shall tell this patient that she may have some temporary discomfort or pain on the right side there is a remote possibility also that this tissue may be so pathologic that the normal function of the gland cannot be maintained In the right mesosalpinx ligament the individual blood vessels supplying the tube are separately ligated close to the tube We are trying by this method to disturb as little as possible the circulation in the mesosalpinx for the integrity of the retained ovary depends upon the maintenance of an adequate circulation The cut surface of the mesosalpinx and the raw areas on the posterior surface of the uterus are covered over by the Webster method of suspension

Case III —The next patient a woman of twenty nine married comes into the clinic complaining of lower abdominal pain of one month s duration

The past history is not important except that at the age of nineteen following a normal full term labor she was confined to bed for five months with a high fever Menstrual periods have always been regular and normal but since her labor she has had dysmenorrhea No other pregnancies No leukorrhea

Present Illness —Three weeks before entry the patient had pain in the lower abdomen with nausea but no vomiting (She had had an appendectomy at the age of twenty four) With the onset of the menstrual period the pain became aggravated The period was not abnormal except for the severe pain

which has persisted The patient had had similar attacks since the birth of her child although not as severe as the present illness

Physical examination was negative except for the marked tenderness and rigidity of the lower abdomen and the presence of a fluctuant mass obliterating the culdesac The entrance temperature was 39° C The leukocytes were 23 000 with 76 per cent polymorphonuclear cells A cervical smear showed numerous streptococci in short and long chains The uterus was retroposed and fixed Both broad ligaments were infiltrated

Discussion —This woman gives a history of a high fever coming on after labor and an illness which confined her to bed for five months In postpartal disease the streptococcus plays the most important role although the colon bacillus gonococcus staphylococcus and staphrophyte play a considerable part The course of a pelvic infection depends upon the nature and virulence of the infection the resistance of the woman and the condition of the genital tract An infection is more serious during the puerperal pregnant or menstrual cycles than in the resting condition During pregnancy or the puerperal state the anatomic changes in the blood and lymph vessels offer a most favorable field for the development of bacteria and the absorption of their toxic products Lymphangitis phlebitis and septicemia are frequent at this period due to the alteration of the pelvic circulation This patient presents now with a pelvic abscess We have however already mentioned that the commonest infection of the pelvic organs and the most frequent cause of suppurative inflammation is an invasion by the gonococcus which causes a bilateral salpingitis and leads to closure of the tubal ostia by involving the mucosa Tubal infection due to the streptococcus staphylococcus and the colon bacillus is often unilateral and results from a spread of the inflammation through the lymph stream from diseased and neighboring parts *i e* metritis cellulitis peritonitis In contrast to the gonococcus the former organisms attack the serous coat (perisalpingitis) and by adhesions and angulation may close off the abdominal ostium However they rarely cause a pyosalpinx and more uncommonly a pelvic abscess years after the initial infection

Treatment—The day following her admission a posterior colpotomy was done and the abscess fully drained and packed with gauze A culture from the pus was sterile The temperature dropped to normal for one week with a subsequent rise after that period The colpotomy was again opened and considerable drainage followed with alleviation of the symptoms Two weeks later the patient was discharged with a normal temperature and leukocyte count and with a tender mass on the right broad ligament In the last month this woman has entered the hospital twice on account of recrudescence of pelvic pain and fever once incident with the catamenia The induration in the culdesac meanwhile has steadily diminished in size while the mass in the right side has become larger Three intramuscular injections of sterile milk (10 c c) have been followed by no constitutional reaction or apparent alteration of the inflammatory infiltration The temperature and leukocytes have been normal for ten days

After six weeks of conservative treatment without improvement we shall inspect the pelvic pathology this morning The vagina has been thoroughly cleaned by the method already described The abdominal wall is opened by a midline incision We expose the pelvis by packing off the bowel with rubber dams Now we see the typical picture of a pelvic infection with the crippling residuum of the involvement manifested by adhesions between a retroposed uterus small bowel and adnexa and a left tubo ovarian abscess fixed in the culdesac It was this abscess which was drained by the previous colpotomies The right tubo-ovarian mass however is adherent to the anterior surface of the broad ligament immediately on top of the bladder Because of the rather unusual position of this abscess drainage by a vaginal incision could never be effective We feel that the lesions are so extensive in this patient and her suffering has been so constant that a complete removal of the pelvic structures is indicated We shall do a panhysterectomy and bilateral salpingo oophorectomy as offering the best chance of a complete cure and affording a satisfactory method of thoroughly peritonealizing raw areas in the pelvis

CLINIC OF DR H H SEARLS

University of California Hospital

POSTOPERATIVE VENTRAL HERNIA

An examination of the literature reveals Gerdy s report of the surgical repair of a large ventral hernia in 1836 as the first record of such a procedure Hampered by the poorly developed technic of his day he nevertheless ingeniously devised a method which gave relief He inverted the entire sac including the skin and sutured the edges of the ring together He then poured ammonia into the inverted sac causing a chemical denudation and resultant adhesions He states that he obtained firm union in seven or eight days

Other procedures were tried with varying success There could be little hope for surgical cure of any type of hernia until a technic permitting primary union of wounds had been perfected for infection is even with modern asepsis the commonest cause of recurrence

Maydl in 1886 first used a technic approaching present day methods He dissected out the various layers and repaired them separately

Following his work the next few years saw surgeons emphasizing the importance of the muscular layers of the abdominal wall and various muscle plastic operations were devised

In 1890 Sanger made the first attempt at a purely fascial plastic operation for ventral hernia

In 1899 W J Mayo brought forward the principle of an overlapping fascia plastic from above downward This idea steadily gained favor and is probably the most popular method today It was primarily designed for umbilical hernia yet the principle may often be applied to postoperative ventral hernia

Judd in 1912 following out this same idea suggested utilizing

the entire abdominal wall except the skin and subcutaneous tissue as a single flap applying the peritoneum of the upper flap to the anterior surface of the fascia of the lower flap He found that this method gave as good a result and shortened the operation materially

With this brief history of the development of the surgical treatment of the condition we will now proceed to the discussion of the problem as we find it today The ideas presented here are in general those of the members of the surgical department of the University of California Medical School A study of 10 cases operated on by the writer will serve to illustrate various points in the discussion

Etiologic factors are of importance They must be well understood in order that we may prevent the development of hernia in our laparotomy wounds Infection of the wound with sloughing of fascial layers is the most common cause of the later development of hernia Mikulicz emphasized this point We believe however that careful treatment of such infected wounds may often result in a strong wall and prevent this sequel Six cases in our series had infected wounds with prolonged drainage following the first operation

The type of incision is important A long incision may cause a hernia through the cutting of nerve supply and resultant atrophy of muscle It is to avoid the long wound that Mayo advises a separate incision for removal of the appendix if it is found diseased when an operation on the stomach or gall bladder is being done through an upper abdominal incision

The type of closure bears directly on the problem Following Dr W I Terry's lead the members of our staff lay great emphasis on the careful closure of laparotomy wounds A running suture which will leave no pockets or holes closes the peritoneum and transversalis fascia or posterior sheath of the rectus Closure of the muscle layer is not considered important and only a few interrupted approximating stitches if any are used The fascia (aponeurosis of the external oblique or anterior sheath of the rectus) is the strongest layer of all The mere approximation of the cut edges of this thin fibrous sheet would not permit

of a strong union Accordingly after carefully cleaning off the subcutaneous fat one edge is overlapped on the other for a distance of ½ cm or more by means of interrupted mattress sutures of catgut and the free edge tacked down with a second row of sutures This gives a broad firm union This procedure is routine and we consider it the most important step of the repair

Transection of muscle fibers is avoided as this is felt to be a factor in the development of hernia

Drains left in the wound over a long period may cause the formation of hernia

The site of the wound has a bearing on the incidence of hernia Rarely do we find postoperative hernia in the upper abdomen the weight of the viscera resting more heavily on the lower abdominal wall All of the wounds in our series were below the level of the umbilicus

Postoperative vomiting coughing or distention may cause a hernia to develop before the wound is healed A rapid post operative increase in weight may overstretch the structures of the wall by increasing the volume of the abdominal contents

Postoperative hernia may be of any size The defect in the wall through which the contents of the hernial sac pass varies in area from a tiny opening to the involvement of an entire quadrant of the abdomen Aggravated cases may require extensive resection of their visceral contents as pointed out by Haynes recently

The fundus of the sac is generally separated from the overlying skin by a very thin layer of scar tissue (Fig 388) It is here that the surgeon must employ infinite care to avoid opening the sac with coincident possible injury to the bowel The contents omentum and bowel are practically always adherent to the sac Adhesions between omentum and gut and between adjoining loops of bowel are generally found They were present and extensive in all of the cases of this series Pain due to the pull of such adhesions together with kinking of the bowel often brings these patients to the surgeon Two of our series had gastro intestinal symptoms referable to this

Preparation of the patient for surgical treatment is important In a large hernia a gradual readjustment of the intra abdominal pressure by reducing the hernia and maintaining reduction with adhesive or a binder may prevent the development of serious postoperative embarrassment of the diaphragm due to the sudden increase in abdominal contents To the same end a strict obesity diet continued for several weeks before operation is of value Sand bags placed on the abdominal wall will accomplish the same result

As in the simple laparotomy closure we feel that the main support in the operation of ventral herniaplasty is gained through

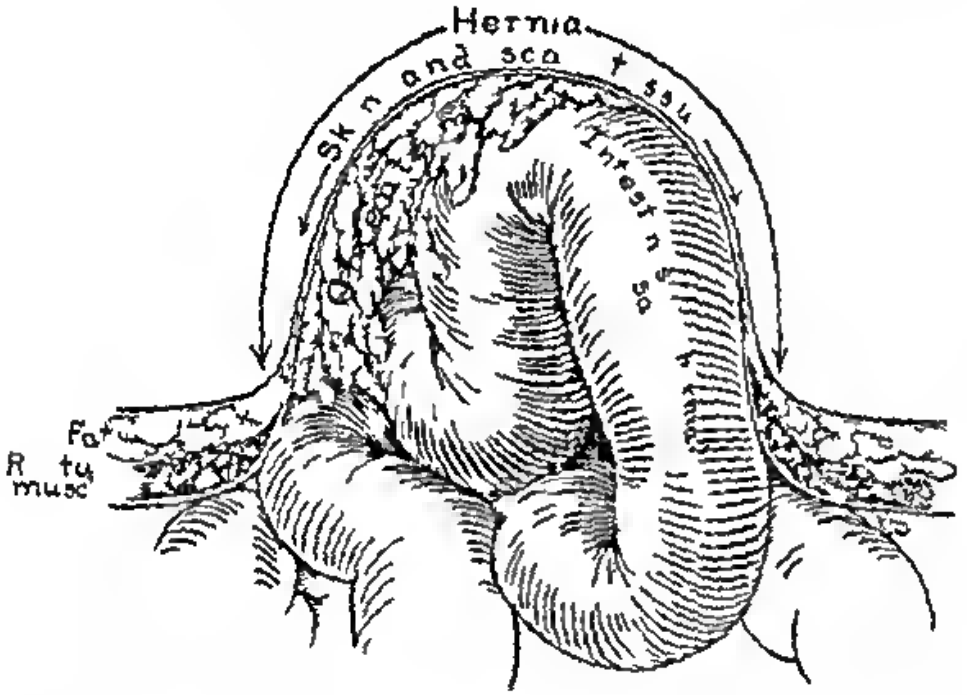


Fig 388—Emphasizing the point of the lower fundus of hernia

imbrication of the fascia The size and shape of the defect are carefully studied before operation and the type of fascia plastic to be done is decided upon That direction of closure is chosen which promises the least tension on sutures The Mayo type of operation is the choice where the defect is circular or has a longer horizontal axis but with a narrow defect having its long axis vertically imbrication from side to side may appear more logical In 8 of the 10 cases the latter was indicated the Mayo type being used in the other 2 Preparation of the skin with

utmost asepsis is important because of disaster resulting with infection

Often the old scar is excised completely by an elliptic skin incision or in very stout people a transverse crescent shaped

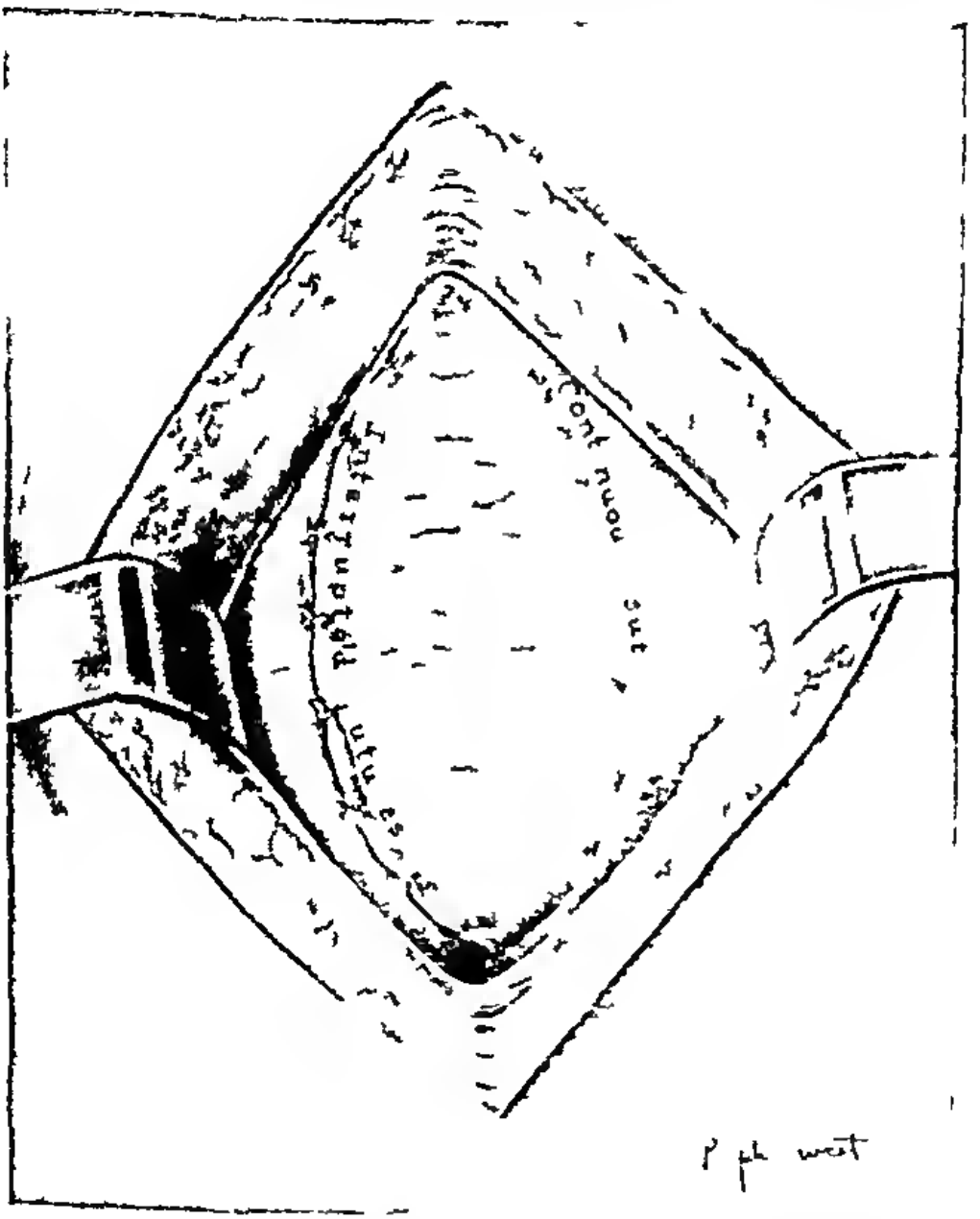


Fig 389.—Imbrication of redundant peritoneum and transversalis fascia (or posterior sheath of the rectus)

incision with excision of subcutaneous fat may be used In 6 of our cases the scar was excised in the other 4 the transverse incision was employed Incision through the skin and sub

cutaneous fat is begun in a fairly normal region and developed down to the fascial layer Working at this level the sac is approached cautiously from all angles Dissection is carried up on to the sides of the sac as far as the fascia extends The

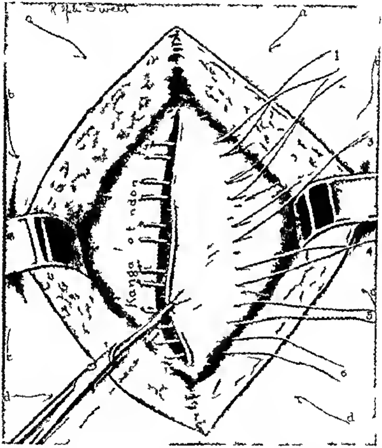


Fig 390—Ka g oo t nd matt e tu th fa al lay b d
D mal te t n s tu e pl d

fascial layer is then dissected free from underlying structures Rarely a muscular layer may also be dissected out The sac is then opened with great care along the base of one side Adherent omentum is excised adherent gut freed and replaced in the

abdominal cavity The redundant peritoneum scar tissue and transversalis fascia often a fairly strong layer are used as a broad imbricating flap over the site of the defect (Fig 389) If the muscle layer is available it is sutured together Interrupted

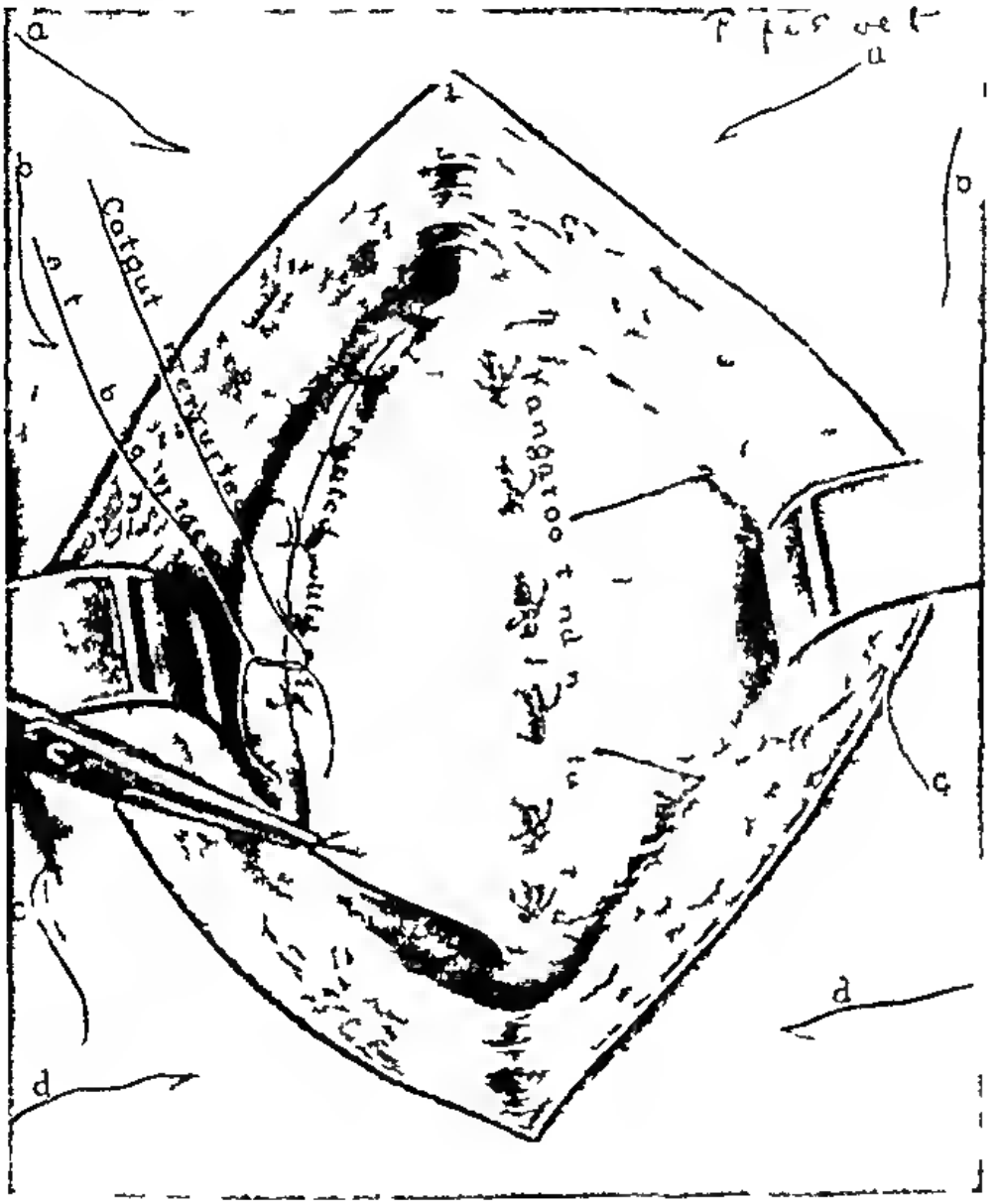


Fig 391 —Mattress sutures tied and imbrication completed

mattress sutures of kangaroo tendon are laid in the fascia and then tied with resultant overlapping (Fig 390) As broad an imbrication as possible without severe tension is obtained The free edge is held down with interrupted sutures of chromic gut (Fig 391) Retention sutures of heavy dermal or silkworm gut

are passed through the skin subcutaneous fat and the two flaps of fascia to reinforce the closure Subcutaneous tissues are approximated with fine catgut and the skin closed with silk

Where subcutaneous fat is excessive it should be protected throughout the operation with warm salt packs in order to prevent drying out and resultant fat necrosis

If dissection is extensive a small rubber dam drain for the first twenty four or forty eight hours is of value to carry off necrotic fat and other wound secretions

If the defect is too large to permit closure a free fascial transplant may be employed For this purpose fascia lata is ideal In the absence of infection such a transplant practically always lives A flap of fascia lata was used in one case of this series

Postoperative care is important The Fowler or semi Fowler position should be maintained to relieve as much as possible the tension on the abdominal wall Uncomplicated cases are allowed up on the fourteenth day

In this series all of the hernias were in the lower abdomen Five of them developed in midline scars of pelvic operations 4 were low right rectus or lower right quadrant scars of operations for ruptured appendix The remaining case developed a hernia in a right lower quadrant wound which had drained a badly neglected right pelvic pentonitis The appendectomy cases had all drained from three to six weeks postoperatively Four midline wounds had healed by first intention and one following a period of drainage

Seven of the patients were females These were all heavy patients Four of them were over fifty years of age the oldest being seventy two The three male patients were much younger the oldest being twenty five and the youngest eleven

The hernia was noticed immediately after leaving the hospital in the case of 5 of the patients 2 noted it in three months 1 in fifteen months and 1 four years later The interval was not reported in one history

In the series an interval of from six to fifteen months has elapsed since repair of the hernia Eight of the patients have

either been seen recently or have answered a follow up questionnaire All of these consider themselves cured A personal examination of 6 of them revealed no weakness at the site of former hernia Two cases still wear abdominal support All are performing their regular work without hindrance

In closing we wish to outline the following points

1 In all laparotomy closures imbrication of fascial layers is the most important technical step in avoidance of postoperative hernia

2 In repair of postoperative hernia the hernial sac must be approached with great caution to avoid injury to contained viscera The incision should be developed through a fairly normal part of the wall first and the layers identified before proceeding toward the abnormal scarred tissues of the area of herniation

3 The fascia plastic operation with broad imbrication of the important fascial planes by means of mattress sutures of kangaroo tendon gives excellent results

4 This imbrication should be developed in that direction which will result in the least amount of tension on the line of closure

5 The pre and postoperative care as outlined have an unusually important bearing on the results

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